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Technical Editor: C. O. BRETTELLE, M.I.E.E.

Joint Managing Director: E. A. GATEHOUSE, M.I.E.E., A.M.INST.C.E.

Commercial Editor: A. H. BRIDGE.

Manager and Secretary: E. S. MIDDLETON.

OFFICE: 4, LUDGATE HILL, LONDON, E.C.4.

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Public Lighting.

IN his presidential address to the Association of Public Lighting Engineers at the Leicester conference last week, Mr. THOMAS WILKIE referred to two questions of outstanding importance. These two questions were also implied or expressed in some of the other papers and in the discussions which followed them. The first was the appointment in every lighting area of a technically qualified superintendent to be responsible for all matters relating to street lighting; the second was the need for a more advanced outlook on the part of local authorities towards the subject, an outlook that should be proved by a readiness to provide very much more adequate funds than have hitherto been considered suitable.

In regard to the first, while we have always regarded it as most desirable that the electricity and gas undertakings, when municipally owned, should be governed by separate committees, we think there is very much to be said in favour of giving authority to an independent officer to decide public lighting questions on their own merits, without reference to irrelevant local influences regarding the type of illuminant.

The Association of Public Lighting Engineers resembles the Illuminating Engineering Society in providing a common meeting ground for electrical and gas engineers, and concerns itself with the use of the best system on technical and commercial grounds. It is abundantly clear from the papers read before the Association since its formation seven years ago how much electrical development, as well as the public, owes to competition with gas in this field. We have enough confidence in the future of electricity for street lighting to believe that it would not be prejudiced by the unbiased judgments of independent lighting superintendents who carry weight with their committees. We have also enough respect for our profession and industry not to desire for it a cheap victory. About one-third of the public lamps in this country are electrical. The proportion is not by any means what we hope, and expect, it will be a few years hence; but it certainly will

be in our ultimate interest to have advanced more slowly, owing to the high standard for which our principal competitor has striven, than it would have been if we had by now secured the whole load at a lower standard.

Nevertheless, the standard is very far from what it should be, whatever the means of lighting employed. The deficiency is not due to technical considerations, but to obsolete ideas on the part of those responsible for financing schemes. It is, as the president stated, almost incredible that to-day, with all the dangers attending high-speed traffic, money for lighting the streets in accordance with modern needs should be so grudged. There is now far more danger from accidents in badly lighted streets than there ever was from the footpad, to counter whose activities the allocation of public funds for public lamps was formerly made. The statutory position of local authorities in this connection is full of anomalies. The provision of even a meagre illumination is still regarded as an act of grace. Even in the Local Government Act of last year the vesting of control over highways in the County Councils included, apparently, no power to deal with lighting.

The subject of public lighting cannot be properly considered without reference to the need for uniform brightness in adjoining districts. The difficulties and dangers of night-driving in the county of Leicester were commented upon during the conference; the divergency of views held by the various local authorities on what constitutes adequate illumination was held to be responsible, and to overcome this it would appear that the lighting superintendent should be a regional officer with powers transcending the urban and parish boundaries. How much more is this the case in London, where, without warning, the quality of lighting may change suddenly from fairly good to very bad before the sight of a vehicle-driver can adapt itself to the altered conditions? The unification of control of public lighting in Berlin has effected remarkable improvement in this respect, and some measure of uniformity should accompany the adoption of higher standards in Great Britain also.

A Woman's View-point.

THE importance of securing the approval of women to proposals for domestic electrification has always appeared to us axiomatic. The splendid work that has been, and is being, done by the Electrical Association for Women towards educating the most influential (in this respect) section of public opinion is, we have no doubt, partly responsible for the rapid growth of sales for domestic purposes.

In this issue we publish an article giving a woman's view of what is required of electricity for the home. The writer is without technical qualifications, but that by no means implies the absence of the most important qualification of all for the present purpose—the knowledge of what is wanted in the home. E.M.H. raises points that every consumers' engineer has to answer, and is in some ways severely critical. We welcome criticism, as we have never believed in the ostrich-like policy of not seeing what we may not like, and the article indicates matters that must be explained, improved, or ultimately provided for, if electrical engineers are to receive the full co-operation of women in this important field.

There are, however, several points in which we do not find ourselves at one with our contributor. While accepting our contributor's conclusion that electricity will ultimately supersede gas for cooking, we cannot agree with the adverse view of its present drawbacks. Most hot plates are admittedly too slow to boil small quantities of water conveniently, and the residual heat is often wasted, but this charge does not lie against the electric kettle, even if it has other troubles of its own. Small quantities of other liquids, *e.g.*, milk or soup, which may be required without undue waiting, are quite well catered for by the self-contained saucepan. Those who have had any extended experience of the electric oven are, we believe, quite satisfied in regard to the superiority of the electrically cooked article—that is, quite definitely, not merely a salesman's talking point. Certainly if gas were the only alternative to the coal-fired oven, the saving in labour only would commend its use, but a curious commentary on the force of custom is to be found in the acquiescence of those most dainty in the service of food at table in a method of cooking that permits the dirty products of combustion to come in contact with what is to be eaten.

We also do not share the belief that in the perfect electrical home an electric blanket would not be necessary. Many people dislike heated bedrooms, except for the comfort of radiant heat while dressing and undressing, and to get into a bed properly warmed, as only the electric blanket can warm it, on a cold night gives the same feeling of exhilaration as do cool sheets in summer.

While we feel impelled to dissent from some of the opinions of our contributor, this does not in any way modify our view that such opinions are worthy of consideration and, indeed, must be considered by supply engineers, if only for the purpose of their refutation.

Damage to Crops.

AN expectation of advantages to the countryside from electrification will not cause the farmer to adopt a sentimentally lenient attitude towards any damage that may be done to his fields during the erection of overhead lines. He may even regard it as legitimate to abrogate in advance, to his own benefit, some of the profits which he is convinced the supply authority will exact from himself when the supply has been started. Knowledge of the cost of crops and ability to assess the value of damage on the part of the resident engineer or wayleave officer will often save trouble later, and will, moreover, earn the respect which the farmer is ready to accord those who seem to him to know their work. We publish on a later page an article by Mr. T. A. GEORGE, which we believe will be helpful to supply engineers in gaining an insight into this aspect of rural electrification. The method suggested gives a ready means of making a preliminary estimate, and allows of adjustment to meet local conditions.

An Integrated Electricity Supply.

THERE were few papers of electrical interest read before the British Association, a report of whose proceedings at Bristol is continued in this issue. The paper by Messrs. A. LENNOX STANTON and THEODORE STEVENS, on "Obscured Fundamentals in the Development of Integrated Electricity Supply" was notable in its presentation of essential requirements for the development of the electricity supply industry on sound lines. The weak points in present methods are thoughtfully discussed, particularly those relating to the consumer. In this connection the authors draw attention to the multiplicity of declared voltages and the difficulty of obtaining suitable data as likely to hinder load development—obstacles that have often been referred to in these columns. They also present a history of the progress of electricity supply during the past few years by a survey of the statistics issued by the Electricity Commissioners. This covers similar ground to that dealt with in the series of articles analysing the main trends of development from 1921 to 1929 which was contributed by "R. H. S." to our columns on August 22nd and 29th, and September 5th, 1930. The authors also rightly point out that while much good may come from systematic cheap generation, progress must inevitably be slow in those sections of the supply system that affect consumers' bills.

Power Station Operation.

IN his paper presented at the British Association meeting, and summarised on another page, Mr. G. A. ORROK related variable factors in power-station design to operating efficiency. This is the most elaborate attempt of which we are aware to introduce quality of operation into the comparison. How important the human element still is has often been pointed out by us, and it will be clear from Mr. ORROK's estimates that only the highest technical skill will enable full advantage to be taken of developments in design.

The Drumm Battery.—II.

Further notes on the technical features and particulars of the recent public trials of the new battery.*

By ROBERT N. TWEEDY.

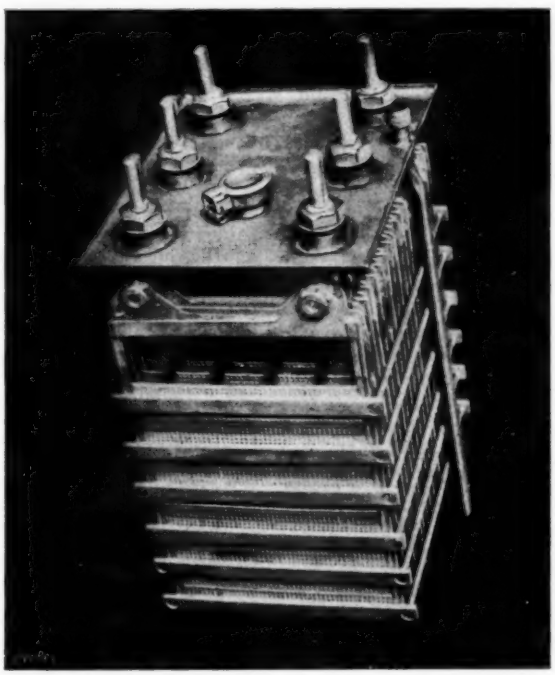
FIRST of all, two apologies are required—one to the Editors and readers of the ELECTRICAL REVIEW for pulling their legs; the other to Mr. Fay, Secretary of the Shannon Development Board and member of the Electricity Supply Board, who, next to Mr. McGilligan, Minister for Industry and Commerce, has been Dr. Drumm's greatest tower of strength, but whose name was omitted from my first article.

Far from wanting to praise Drumm, Fay, McGilligan and Co., I ought to be trying to get my own back on them for pulling my leg, and making me the unwitting instrument for pulling yours over that specification! It was good in parts, no doubt, and it was—and is—the latest specification to which you and I have right of access; but all that patter about the positive seems to have been the usual conjurer's and patentee's device to distract the attention of the intelligent audience from the real thing.

How far our friends who make other kinds of battery are justified in saying, as I am confident they are saying, they knew all along that the specification was a pretty piece of camouflage, I do not know. Anyway, I wish they would not, because I hate being the only little bear without a tail.

The fact is that the negative is the really important part of the invention—that and perhaps some little thing in the electrolyte.

The positive plates in the battery used in the public trials, about which I shall tell you, were made by Batteries, Ltd., of Redditch, and are very slightly modified "Nife" positives.



Assembly of Plates in Drumm Battery.

I am permitted to say that the positives of the battery, when that has reached the commercial stage, may be made by a firm who have guaranteed already a life of ten years under the conditions laid down by Dr. Drumm.

Ten years definitely guaranteed for the positive, and how long for the secret negative?

A hundred years, if you like to worry about such periods, says the inventor.

The negative is said to be indestructible.

As for the electrolyte, it is caustic potash, and must be renewed or de-carbonated once a year. That is a small matter when the cell is properly designed, and when a fancy price is not charged for this common material.

The negative plate looks like a very common thin sheet of metallic gauze. It is not a zinc electrode, but I believe that both zinc and aluminium enter into its make-up.

The real reason why no one can criticise the invention is that it involves a completely new electro-chemical phenomenon, which is being explored by an eminent Fellow of the Royal Society. Dr. Drumm, who observed the phenomenon, has propounded a theory, but he is not sure that it is the correct one.

In the meantime the phenomenon itself is being put to work in the interests of mankind, and that brings us to Celia, Ltd. Celia, Ltd., is the company which was formed about a couple of years ago to undertake the business development of the Drumm patents. When the company was formed, its immediate object was to secure the capital necessary for the bare cost of research and laboratory experiments; therefore the board of six directors included two (or three) business men who perhaps might have known the difference between a battery and a booster.

Then, owing to the enlightened action of Mr. Patrick McGilligan, the State provided the cash, and made unnecessary the continued inclusion of laymen on the board. Mr. Fay, another of Dr. Drumm's contemporaries, and an engineer with considerable experience both on the civil and electrical sides, was appointed managing director, with a director responsibility to the Government. Probably Celia, Ltd., has not consisted of much more than Drumm and Fay since the frankly commercial elements were deleted, but it is likely that a reorganisation is in progress now that the manufacturing stage is imminent.

I would go so far as to swear that the only people to be "let in on the ground floor" in this case are the citizens of the Irish Free State as a whole. The State has secured at least 51 per cent. of the financial interest in the invention, and I hope the inventor has managed to stick to the balance, although—knowing what generally happens to inventors—I should doubt it.

So far as I can judge, the people, after those mentioned, who have been most actively useful in producing the results which the public trials have disclosed, are Prof. Nolan, of the National University, who was one of those appointed by the Government at a very early stage to investigate Drumm's experiments; Mr. W. H. Morton, chief mechanical engineer; Mr. Warren Storey, elec-

* A previous article on the subject appeared in the ELECTRICAL REVIEW of August 22nd, 1930.

trical engineer; and Mr. J. Ash, chief draughtsman, of the Great Southern Railway of Ireland. It is due to these men to say that they have produced between them, at the Inchicore Railway Works, within the space of two months, as fine a piece of work as ever came out of a proper storage-battery works.

With the exception of the positive plates, every part of the battery was designed and manufactured on the spot. The positives are almost, if not quite, standard Nife plates, but it must not be assumed from that fact that those positives are destined to be used when the battery is marketed.

The positive and negative plate assembly is clamped very firmly together, and each pole is provided with three large section nickelled terminal posts connected by square section bars of the same nickelled iron alloy of high conductivity. There are eight negatives and nine positive plates in each cell, and the positives are in close contact with the container, which is made of Monel metal for the trial battery. but probably will be made of a cheaper material. The positive and negative plates are held apart by ebonite rods of remarkably small diameter.

The battery is housed in heavy wooden crates, which are slung under the carriage frame in the usual manner, except that no special arrangements have had to be made for changing the battery during the day's run.

The coach on which the trials are being made is about 30 ft. long on an under carriage which seemed to be of the standard four-wheel pattern, without any aids to comfort for the battery in the shape of shock absorbers, other than the standard axle springs.

All the work connected with the trials has been done at high pressure, and very little consideration could be given to coach and truck design. The great thing was to build something which would carry the equipment and a few observers.

Because of that the test results from the purely traction point of view are nothing to boast about, but that fact detracts in no way from the remarkable characteristics of the battery.

The actual consumption of energy per ton-mile was about 85 watt-hours, which is approximately twice the figure which would have been obtained on a coach of more suitable design. The last official statement argues, very reasonably, that the distance covered per charge in the trials would have been doubled if a standard bogie coach had been used with the same ratio of weight of battery to weight of coach.

Dr. Drumm claims that his invention elevates battery traction in one huge leap from the ten-miles-an-hour crawl, which seemed its best hope, to the high speed levels set by steam and petrol vehicles and trains. A study of the data given below will enable the reader to estimate the value of that claim.

Not the silghtest attempt was made during the public trials (which were made over a full working day on August 27th) to save the battery. The run was between Inchicore and Hazelhatch, which includes a long climb and one of the stiffest grades on the Free State railways. The coach was handled by an express locomotive driver, who was keen to show off the paces of his new charge, and ran it all out.

The maximum speed was 50 m.p.h., and was attained on the down grade, so it is of no particular importance; but it is far otherwise with the acceleration rates, obtained, be it remembered, from a battery which probably would be called in a catalogue 170 ampere-hour capacity at the half-hour rate.

Maximum kW developed for acceleration ...	110
Maximum amps. discharged ,, ...	1,000
Maximum acceleration rate up to 30 m.p.h. on level, m.p.h. per sec.	1.24
Maximum acceleration rate (up to 30 m.p.h.) on up-grade of 1 to 100, m.p.h. per sec. ...	0.60

Each journey of 17 miles (8½ each way (was started with the battery charged, the rates of charge being approximately 400 amperes for 20 minutes, and 200 amperes for 10 minutes; 600 and even 700 amperes can be poured in for ten minutes without undue heating.

During the official trials on August 21st, prior to the public trials, a total distance of 173 miles was run, for an output of 193,000 watt-hours. The average voltage on discharge was 122, and the average voltage on charge was 152.

The total weight of the battery with crates was 6,000 lb., and it is that gross weight, not the weight of the naked plates, which is used to determine the ratios of output to weight.

An output of 6 watt-hours per lb. weight of battery per hour is available during discharge, but the output per pound weight of battery for that day's run of 173 miles was 33.2 watt-hours; a way of putting the fact which has been responsible for the most colossal sniffs in my experience of sniffers and scoffers. Yet it is a perfectly legitimate claim, and one which might assume much greater proportions if the working day were lengthened. For instance, had it not been for traffic exigencies, at least 40 per cent. more mileage could have been run with a correspondingly greater input and output.

What might occur in everyday service would be something like this:—

Overnight the battery would be charged at a normal rate of 8 watt-hours per lb., and it would be given, during the 8-hour day, twelve boosting charges each of 8 minutes' duration at the rate of 1.6 watt-hours per lb.; the total input would thus be 27.2 watt-hours per lb., and more in proportion as the working day was lengthened.

About the best performance of a lead traction battery would be 8 to 10 watt-hours per lb. at the 5 hours rate, or 2 to 2½ watt-hours per lb. per hour.

Drumm gets about three times the rate of output, but it is really quite useless to pursue a comparison between his battery and any known battery for this particular service, because they are not comparable.

The Drumm battery is the first which has made possible high acceleration under all conditions, high maintained service speeds, and such high safe charging rates as to reduce the dead weight of the battery to an economical ratio with the total weight of the vehicle or train.

No effort had been made to increase the normal cooling rate of the battery as fitted in the usual cramped position under the coach, yet the temperature rise of the electrolyte over the air temperature taken immediately after the official trials on August 21st was 17 deg. C.; and that is a little unfair to the battery, because the readings were taken at 9 p.m., when the air temperature had dropped several degrees rather rapidly.

At this stage I think we should be justified in assessing the value of the Drumm battery relatively to the value of the lead and other batteries to be of the same order as the value of the metal-filament gasfilled lamp relatively to the carbon-filament vacuum lamp. That it will cause anything approaching a revolution in traction from the point of view of the general public I do not believe, nor do I think the inventor and his associates would suggest it.

[A search at the British Patent Office in London shows that, although eleven applications for British patents have been filed by Dr. Drumm, no complete specification has so far been issued. On the other hand, the word "abandoned" now appears against the number of three of the applications.—EDS. ELEC. REV.]

Electrically-heated Boiler Plant.

We learn that Escher Wyss & Co. have lately secured a contract from the Swiss Federal Railway authorities for the installation of an electrode boiler plant at the station at Geneva for the pre-heating of railway trains. The plant will comprise a boiler heated by electrodes taking 400 kW at 1,000 volts and generating steam at 227 lb. per sq. in., and also two steam accumulators each having a capacity of 282 cu. ft.

"My Lady's Pleasure."

These notes have been submitted by a housewife who possesses no technical knowledge and merely expresses her point of view as a user of electrical appliances in the home.

By E. M. H.

TO-DAY we women are seeking release from the treadmill of unnecessary labour, and we look to electricity to effect this by improving conditions in the home. It may be thought that some of the suggestions that follow are frivolous; others may be impracticable for all I know to the contrary, but they are all based upon an absolute need—not to the lazy housewife, but to the efficient one.

In the first place, electricity must be taken to every town, every village, even to every isolated cottage in the country. When this is done all will be able to enjoy the advantages of electric lighting; no more fumbling in the dark for matches, no more unsteady flares or breaking gas mantles, no more candle grease on the stairs, and, above all, no more nasty smelly oil lamps!

I am constantly reading complaints in the daily Press concerning the unsightly towers or pylons that are said to be disfiguring the countryside. I believe I am expressing every woman's point of view when I say that if towers mean beautiful and clean homes, if they mean absence of smoke and dust in residential and rural areas, if they mean fewer of those terrible brick walls and mounds of coal, which to me signalise every power station and factory, we welcome the towers and are perfectly willing to sacrifice—if it is a sacrifice—our artistic tastes to our health and the health of our children.

The vacuum cleaner with its various fitments for taking the dust out of each remotest corner will be the efficient servant of every housewife who, no longer breathing in millions of microbes every working hour, will gain enormously in health as well as cleanliness. We need also polishers, both for floors and furniture, and a window cleaner, while, in households with growing children, a mat which would automatically remove and absorb mud might be an advantage in the entrance hall.

The electrician has given us cooking stoves, but up to the present these are unsatisfactory, for pies and cakes baked in them are apt to look anæmic and possess none of that tempting brown, flaky appearance.

The toaster is slow, and breakfast loses its crispness; if one is in a hurry for a cup of tea, it seems almost as quick to boil the kettle up with matches as to wait for electricity to do its work. For cooking *en casserole* electricity is useful—but so is a fireless cooker. This simple device, better known in America than in this country, is made on the principle of a thermos flask; it is a padded box into which are fitted two or more removable pans. Anything which requires long and gentle cooking may be brought to the boil, then placed in the fireless cooker, and safely left for an indefinite number of hours. In short, to use successfully the existing electrical cooking apparatus requires long forethought, and in every instance I would say "Give me gas." With certain improvements, however, and an all-round speeding-up, electricity will ultimately take the place of gas, just as gas has ousted coal as a culinary medium.

In the preservation of food, electricity has never had a rival, and nearly all the refrigerators are excellent, although the price is still prohibitive to the small householder. Whether it would be possible to supply, at a low price, a more compact article that would yet be effective I do not know, but, if so, it would have a ready sale.

There are still a thousand and one uses to which electricity might be put in the preparation of food; delicate gadgets are required for scraping new potatoes, to be adjusted for peeling old ones or hard fruits, for stoning fruit, for boning fish and chicken without waste and for cutting beans, shelling peas, beating eggs, chopping, and mincing.

We do not want an electric lift for carrying coals, for coal must be for ever banished from the home, but a service lift or table would save many footsteps and much carrying. There are electric fires and electric heaters which may be taken from room to room. These are useful, but we want our homes warmed by artificial sunshine—sunshine with all the health-giving attributes of summer air; we need, not electric fans, but ventilation which induces free currents of air without draughts and without exposing ourselves and our household gods to the vagaries of climate. That is, we look to the electrician to give us an indoor climate, pleasant and equable, in which we may go always clad in light raiment, at once hygienic and beautiful.

There are, too, electric blankets; these we shall not need in our perfect houses, but, instead, we shall require electrically-warmed clothing for out-of-doors.

That "fuzzy" sensation which I feel in every iron and toaster I have used must completely disappear. We need also an electric dish-washing machine—one that will cleanse even forks with the most meticulous care, dry each article, and place it in its dust-proof rack. Conversely, I would suggest, but as less practicable, another robot capable of laying the table according to the number of persons to be present at a meal. While the washing-up is being done, yet another machine is wanted to grip our shoes, remove the mud, and polish them.

All laundry work should be done communally, but, as we English are too conservative lightly to give up our individual burdens, there is no reason why we should not be supplied with a small electric washing machine with—this is important—a special device for cleaning abnormally soiled parts of linen *without tearing it to pieces*. A quick-drying apparatus and an adjustable mangle are also wanted.

The electric iron is one tool which is excellent and a pleasure to use, except that the connecting wire is sometimes in the way. A coil for heating water by immersion is a useful adjunct at odd times. This is already on the market, but it is very expensive and slow.

For needlework there are good machines, but all too large and cumbersome, and, like the ordinary treadle, more suitable for workroom or factory than for home use. I would suggest a very small one, not much bigger than a flat-iron, that can be packed away into a small space when done with. This machinette should have attachments for darning and for sewing on buttons.

Electrical apparatus is much used in hair and beauty treatment, usually professionally, but, until we get the ideally ventilated and warmed houses described earlier in this article, a simple hair-drying machine would be useful, also brushes and combs, and rollers for personal massage.

All these various instruments should be self-cleaning, easily adjusted, and need only the least possible attention. Besides all this, they must be both inexpensive and safe—there must be no danger of finding an electrocuted baby because the current which should have rocked the cradle shocked the child; while, as for the power itself, that must be, not only universal and reliable, but cheap.

Dredging for Alluvial Tin.

A brief Description of a Recently Erected Electrical Plant on the West Coast of Siam.

By H. W. SEWELL, A.M.I.Mech.E.

MORE than half the world's supply of tin comes from the Malayan peninsula which includes the Malay States, Federated and Un-federated, the Straits Settlements, Southern Siam, and Lower Burma. In this part of the world there are some seventy European tin mining companies (dredging is considered as mining) and about twenty Australian companies. The total number of dredges (tin miners drop the final " r " of dredger) now at work in the Malayan peninsula is roughly 120, of which only some 25 per cent. are operated electrically, the others being driven by steam or internal-combustion engines. Eighty per cent. of these dredges are British built; the remainder were made in Holland, U.S.A., and Australia.

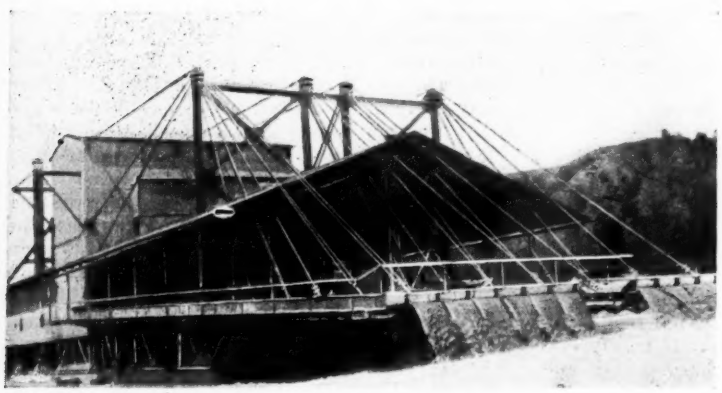


Fig. 1.—Settling Tables.

Alluvial tin is obtained both by dredging and by sluicing (washing down the tin bearing ground with a strong jet of water and pumping from the sump onto " tables," where the tin is collected). The last method is that usually employed by the Chinese, who avail themselves of electric power if a bulk supply is near.

Dredges work, not only in the rivers and in the sea, but also on what was formerly dry land and is so again after the dredge has done its work. Sometimes dredging is carried out at considerable heights above sea level. The necessary supply of water for the dredge " paddock " must then be arranged for by artificial channels with either natural flow or by pumping. The amount of water required is not large, but must be sufficient to prevent the " paddock " water from becoming sufficiently thick with slime to cause trouble with the pumps on the dredge. The tin dredge uses buckets in a similar way to the harbour or river dredge, but these buckets deliver into a rotating screen, which passes the stones, &c., directly to the " tailings " at the rear of the dredge. The tin bearing sand passing through the screen flows down the " tables," where it is continuously raked by Chinese coolies to assist the tin to settle on the tables and the sand to pass on and over the end of the dredge on to the tailings. Fig. 1 shows sand and water flowing from the tables. Large quantities of water are pumped into the screen to break up the large particles and to assist the flow of the sand over the settling tables to which reference has been made.

Once in twenty-four hours the dredge is stopped to collect and bag the tin ore which is then sent to the tin shed for further washing before being shipped to the smelters. Some of the more recently designed dredges dispense with tables and use jigs. These appliances separate the tin ore and should save more tin than is possible with the older method; they also obviate the stopping of the dredge to collect the tin, since the bagging is a continuous operation. Dredging is carried out to various depths, depending on the thickness of the tin bearing strata; usually 60 ft. is about the greatest depth, but a new dredge is now working very successfully down to 110 ft. below water level.

Since the only means of moving a dredge is by its mooring ropes, one ahead and two on either side, the mooring winch is a most important part of the equipment. This winch has six barrels, all operated by one motor, with clutch and brake controls on each barrel. The extra barrel is used for lifting heavy parts for repair and for dealing with sunken logs, &c. A dredge is in constant movement from side to side of its paddock, a distance of, say, six to eight chains; the speed of travel should vary according to the depth and the material worked, and a fast speed should be provided to handle the wire ropes quickly when their anchorage is being changed, as it frequently has to be. On occasions, when working in heavy material, the motor driving this winch has to meet heavy overloads. Some few of the electrically driven dredges, operating singly in isolated places, have their power plant on the dredge itself; this consists of Diesel engines driving alternators. For more than one dredge, however, a shore station is obviously the better proposition both from the financial and the operating point of view.

The following is a brief discription of a recently erected plant on the West Coast of Siam. It was designed to run three dredges, two new ones built for electric drive and an existing steam-driven dredge which was converted to electric drive. Fig. 2 shows the steam-driven dredge before conversion.

Fig. 2.—Steam-dredge before Conversion to Electrical Operation

The power house (fig. 3) is a steel-framed building covered with corrugated asbestos sheeting; this, with the ample ventilation provided, makes the engine room com-

paratively cool even in the height of the dry season and with an average air temperature of 84 degrees F. all the year round. The plant consists of three 500-kW (at .8 P.F.) 3,300-volt, 50-cycle alternators, made by the English Electric Co.; these are driven by Belliss & Morcom high-speed engines. Steam is provided by Babcock and Wilcox land-type water-tube boilers working at 230 lb. per sq. in. and superheating the steam to 600 deg. F. with a nominal output of 10,000 lb. of steam per hour; soot blowers and automatic feed regulation are also provided. Make-up feed water is taken from a shallow tank underneath the condenser after it has been used for sprinkling the condenser pipes; its temperature is therefore raised before it passes into the economiser. The water in the hot well is further heated by a coil, through which passes the exhaust steam from the feed pumps. The boilers and their furnaces are specially designed for burning mangrove wood.

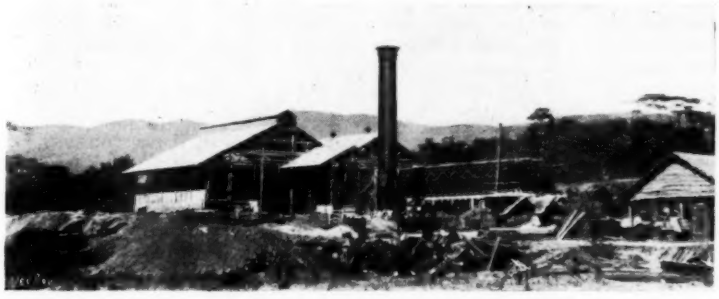


Fig. 3.—General View of Power Station.

The switchgear is also of the English Electric Co.'s totally enclosed mining type; this design is necessary on account of the climatic conditions and of the insects, &c., in this part of the world, of which the mason wasp is perhaps the most troublesome. All the auxiliary plant, air, circulating, and condensate pumps, are provided in duplicate, as are also the motors for the induced draught fans, the pumps supplying water to the storage tank for condenser, and the two steam-driven Weir feed pumps; all except the feed pumps are motor driven. A Green's economiser and a 60-ft. self-supporting steel chimney are included in the plant. The whole erection work, including the reinforced concrete tank and supports for the condenser was carried out by unskilled labour, except for three Chinese boiler makers. Fig. 3 gives a general view of the station with the evaporative condenser to the right of the chimney.

Mangrove wood was chosen as the fuel for the boilers, as a practically inexhaustible supply exists in the belt of these trees which fringes the western coast of the peninsula for some hundreds of miles, the power house being within two miles of the belt. The wood is cut by a native contractor in nominal lengths of 4 ft. and is brought in his boats and sampans to the company's wharf, where it is unloaded on to the company's trucks and brought to various stacking spaces on the side of the 2-ft. gauge track. The logs are kept in stack as nearly as possible for six weeks; if used earlier the wood is too wet, if later it has begun to deteriorate. From storage the logs are again loaded on to trucks and brought to the power house siding, from which truck are hauled up to the firing floor, as required, by a motor driven friction winch. Logs are charged directly from the trucks into the furnaces, this arrangement making for a clean floor and less handling. The empty trucks then leave the boiler house and stand on the other siding until they are collected for reloading. Mangrove wood, when burnt on a grate with small air gaps between the fire bars, say, $\frac{3}{4}$ in., makes little ash, and what there is of it can be washed away after being raked out from under the bars. The diameter of the logs varies from 8 in. to 3 in., and its price delivered to the power house siding is slightly under 18s. per cord of 120 cu. ft., the average weight of a cord after six weeks in stack being 5,000 lb. It is found that a little over 7 lb. of this fuel are needed to produce 1 kWh. Although the mangrove grows only on land covered at high tide by the sea, no trouble has been experienced with the salt in the wood.

Current is distributed to the dredges by means of overhead lines carried on steel poles, an earth wire being fixed on the top of the poles. The lines are erected parallel to the proposed routes of the different dredges and carried beyond the dredges, so that as the dredge moves forward all that has to be done is to move the end box of the trailing cable forward one or more poles, the tail ends from the dividing box being bolted to the line wires by copper clips. The trailing cable (cable connecting the overhead line to the dredge) works under very rough conditions; usually part of the cable is in the water of the paddock and part is lying on the tailings, over which it is sometimes dragged. It is also exposed to the direct rays of the tropical sun. Again, if sufficient attention is not given to it, the cable may have to stand a considerable pull, and when its land end is being moved to another pole it may not be handled too gently by the Chinese coolies. The cables used for this purpose are rubber insulated and double steel wire armoured, the armouring having a short "lay"; this last is essential, as the constant movement of the cable opens out the armour wires if the lay is long. No outer serving of jute is necessary; indeed, it will not stand many weeks under working conditions.

On the dredge the end of the cable is connected to a drum of large diameter, which is driven by a small electric motor (to wind up the cable only) through a friction clutch so set that any undue tension on the cable will cause the clutch to slip. The drum is held by a brake with counterweights which serve the same purpose. The ends of the cable are connected to collector rings, carbon brushes taking the current to the cable leading to the transformers on the dredge. The insulation of these collector rings is effected by ordinary straight line-insulators. In the wet season the drum is exposed to driving rain and at all times to splashing from the main screen; all insulation of a hygroscopic nature had, therefore, to be avoided.

Two methods of mounting the cable drum were tried, one on deck level at the side of the dredge so that the cable on leaving the drum descended directly into the water, the other with the drum mounted above deck level and at the stern, the cable being led over the tables and well clear of them by a long boom; see fig. 4. This last method is probably the better in practice as, al-

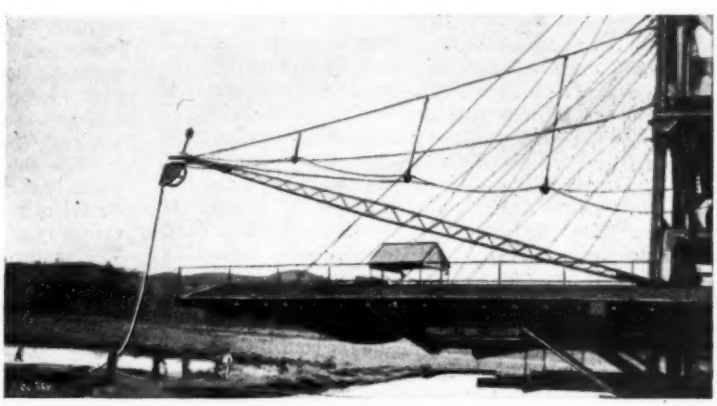


Fig. 4.—Method of Connecting Cable to Dredge.

though it is essential to keep an attendant constantly working the cable drum, it entails less likelihood of the cable being pinched between the side of the dredge and the side of the paddock. With the first method the cable can be floated on empty oil drums, and then half the paddock or more can be worked without moving the cable drum, the cable simply sagging more or less as the dredge moves to and fro.

Although one dredge is smaller than the other two and of different design the electric motors are of similar sizes to provide for interchangeability and are as follows:—

	Dredges Nos. 1 and 3.	Dredge No. 2.
200 h.p.	buckets	buckets and ladder hoist
140 h.p.	pumps	pumps
75 h.p.	ladder hoist	—
50 h.p.	screen	jigs
50 h.p.	L.P. pump on No. 3 only	L.P. pump
30 h.p.	mooring winch	screen
20 h.p.	—	mooring winch
12 h.p.	bilge pump	bilge pump
10 h.p.	auxiliary winch	auxiliary winch
3 h.p.	cable drum	cable drum

Three single-phase 3,000/400-volt transformers deal with the incoming current, and one 3,000/100 single-phase transformer is provided for lighting.

The load factor on the power house after all three dredges had been converted was 80 per cent. The power taken per cube yard dredged was, for Nos. 1 and 3 dredges, almost exactly 1 kWh hour, but for the other dredge the current taken was more, due to the jigs and to the different type of bucket belt. Two of the generator sets are sufficient to deal with the full load of three dredges, workshop, &c.

The 200 h.p. motors drive the buckets through belts; this saves any severe shock damaging the motor should obstructions be met. The control of these motors is by push buttons placed in convenient positions to be operated by the winchman.

The consulting engineers for the electrical plant were Messrs. Merz and McLellan to whom the thanks of the writer are due for permission to publish the foregoing.

Aero-engine Testing.

Notes on the electric power plant employed for testing aeroplane engines, with reference to layout, practical operation, economy, and other similar details.

By "AERO."

(*Concluded from page* 413.)

Combined Dynamometers.

The simpler scheme recognises the limitation of such circumstances at the outset, and deliberately wastes in the water dynamometer that amount of power which cannot be usefully absorbed in any part of the entire works' system. It comprises a composite, but nevertheless compact, dynamometer built up of an a.c. squirrel-cage machine, an hydraulic clutch, and a water brake. Clutch and water brake are in one casing which is bolted to a circular flange on the motor endshield, while the shaft ends are rigidly coupled. That is, the following are in line from the aero engine: (*a*) the engine shaft coupled to (*b*) one half of the clutch, which half also carries the water brake rotor, and which can slip as a whole with respect to (*c*) the other half of the clutch coupled to the squirrel cage rotor. The whole arrangement is swung on trunnions and connected to suitable weighing gear, any power lost in the clutch being directly measurable on the outer frame as with the water brake, of which, indeed, it is a development. It will be realised that the water brake may put a dead load on the engine shaft, or it may run idle, depending on the amount of water admitted to it. Similarly, the hydraulic clutch may transmit full or no torque, since water quantity determines the ability of one of its halves to "pull" the other after it, inside the containing case. If the case is full both halves will rotate synchronously until the input torque exceeds that which can be fully transmitted, after which the input shaft will speed up and the power difference will be wasted in the slip between the clutch halves. The a.c. machine running asynchronously up to about 5 per cent. electrical slip maintains the clutch output shaft at, to all intents and purposes, the necessary fixed speed. Thus the engine may be allowed to run over its whole speed range while a constant frequency electrical output is obtained in a very well known manner.

Thus the composite dynamometer plus an auto-transformer starter and a small composite relay panel, together with the main fan motor, make up the electrical units involved. By suitably choosing the electrical synchronous speed to suit the engine, and proportioning the regeneration electrically to suit works' conditions, a very favourable proposition presents itself, as the capital cost is reasonably low. The operation is simple also.

Reverting to the previous figures, the engines may run over the speed range 1,100/2,200 r.p.m. developing 400 h.p. at 1,100 r.p.m. and higher h.p. above this. The electrical end of each dynamometer would be rated to absorb asynchronously, say, 214 kW at 1,025 r.p.m., leaving 85 kW to be lost in each clutch, the speed slipping 75 r.p.m.

Overload on the electrical end can be dealt with in the ordinary manner, except that the trip circuit is relay actuated to operate motor-driven valves on the water brake, so that, although load may be thrown off the electrical machine, the engine is not allowed to race up suddenly and be suddenly brought down again in speed. The motor-operated valves result in a very valuable cushioning effect being secured on the engine under such circumstances. The addition of maximum and minimum power relays to operate the valve motor render the whole arrangement practically foolproof, as, before the electrical end is near the tripping moment, the valves open to ease the load off the asynchronous machine. Failure of the water supply is more conveniently mentioned later. Again it is frequently necessary to load the engine down to say, 600 r.p.m., while the synchronous speed is 1,000 r.p.m. Here a reverse-power relay is added to trip out the electrical end immediately it commences to motor, the other relays having already transferred the whole of the engine load to the water brake. The power

relay must be shorted, of course, when the complete dynamometer is started up afresh, and while running-in is in progress.

The principles applicable to an a.c. electro-hydraulic arrangement are applicable to a d.c. combination, with some additional advantage in that the " line " speed may be chosen more conveniently to secure larger power recovery, particularly as the d.c. machine can be designed to have some speed variation while maintaining steady voltage by shunt control. The interlocking relays are of simple nature and the only serious additions are main and, very necessary, vernier field regulators, which must be fitted with weak field motoring interlocks. The d.c. combination marks a distinct advance on practice obtaining so lately as two years ago, at which time the hydraulic clutch had not been adapted to the present duty. Then, the electric dynamometer was simply mechanically clutched and bolted up to the water brake, and the variable speed characteristics of the electrical machine already noted were allowed full play, so that it happened that the compound wound fan motor and electrodynamometer were connected to the d.c. line quite close together. The question of line stability was vital, as the inertiæ of the two armatures differed widely. Moreover, a new aero engine on test is a far from stable piece of machinery, spitting, coughing, choking, roaring, and, indeed, rather scaring the uninitiated, to say the least! Consequently the circuit *had* to be stabilised by a battery of large dimension, which added enormously to the capital cost. Control gear was decidedly complicated, and the whole scheme required operation by electrical labour of the highest skill. The large speed range of the electrical end was, however, valuable in allowing a very large return of power, a return sufficient to justify the capital cost at that time, no other satisfactory arrangement for the purpose then existing.

In the more modern equipment it will be realised that the hydraulic clutch will absorb all shocks from the engine with resultant inherent stability on the electrical side. The ability of the last to run at constant or slightly variable speed enables it to be shunt wound, and to be possessed of an armature inertia comparable to that of the fan motor. It may, therefore, be safely built of larger size, return on the test time average as much power as previously, and eliminate the storage battery; the net result is a more favourable economic proposition.

Electrodynamometer schemes obviate the necessity for special running-in motors, except in the instance already noted. The electrodynamometer is used for the purpose, and its control gear is arranged to have the interlocking gear already described to effect running-in exactly as outlined previously, except that it is impossible so fully to interlock the combination of electric and water dynamometers. However, the first step torque-limitation requirement is met mechanically by providing an ingenious water by-pass in the clutch, so that in the motoring direction no greater torque is transmitted than is considered wise for the particular circumstances considered, although full engine torque may be transmitted in the other direction. Under the circumstances the running-in is accomplished in a particularly smooth manner. The a.c. type starts up on dead light load *via* an auto-transformer starter of low tapping.

General Protection.

Essential general protective devices cannot be passed over. It has been convenient to mention before the wind-tunnel damper switch, but the latter bears relationship to the other essential devices in so far as it actuates the same master relay to earth the engine magnetos.

The engine requires oil of correct viscosity and pressure in order to function properly. Hence the oil tanks contain electric heating elements (belts or immersion heaters of low surface rating) for use in winter to heat the oil to the correct temperature, above which the heating elements cut out *via* a single action thermostat; *i.e.*, should the oil temperature fall, the heat is only applied again by a definite action on the part of the operator. This is necessary, since if there be the slightest suspicion of any maladjustment, it is most desirable that the test should be stopped quickly; aero engines are very easily and rapidly injured by apparently minor causes which must have instant personal investigation. Above the critical oil temperature a water-cooling system comes into play to absorb the oil conduction heat from the cylinders. Should this water supply fail, the oil would rapidly become too thin and useless for lubricating, a state of affairs equally as disastrous as were the oil too viscose. Hence a diaphragm pressure switch in the water circulating system actuates the master relay appropriately. A similar switch is incorporated in the oil circulating system arranged to operate likewise when the oil pressure falls below the proper amount (from 25 lb. per sq. in. to 40 lb. per sq. in. dependent on the engine and/or oil used).

Again, the forced water cooling circuit of the fan liquid controller requires a pressure switch in its system, while if water cooled engines are under test their water supplies must be likewise protected.

Overspeed protection is vital, 10 per cent. excess speed only being permissible. Usually an electrical tachometer of the magneto d.c. patern is fitted, positively driven from the main dynamometer shaft, and electrically connected, independently of other circuits, to a voltmeter and voltage type relay. The meter is calibrated in r.p.m., while the relay is arranged to " make " the trip circuit of the main protective panel.

This comprises a double-pole relay, a single-pole relay, d.p. switch, and reset button. The d.p. relay has two sets of contacts normally closed and two sets normally open, the later open-circuiting a coil ignition circuit and the former shorting a magneto circuit to earth. Pushing the button transposes the conditions, opening the earth and closing the battery circuits (either being connected as applicable to the engine under test). The s.p. relay has one set of normally open contacts and one set normally closed. Those closed maintain the coil circuit of the d.p. relay. Those open are connected across all the normally open contacts of the protective devices. Closure of any of these contacts " makes " the s.p. relay which lifts, breaking the d.p. relay circuit and maintaining its own circuit through the closing of its normally open contacts. The opened d.p. relay falls back and earths the magnetos (or opens the coil ignition) and shuts down the engine. No-voltage effects the same result.

In conclusion, it may be of interest to note that the cost of given complete test plants, but exclusive of any accommodation, housing, &c., works out at from £2,000 to £9,000 according to arrangement and size.

Automatic Traffic Signals.

With the increased use of automatic traffic signals in this country the need for standardisation is becoming of importance. At the beginning of the year automatic controls were in operation in some 50 different centres. *The Times* states that the returns which the National Safety First Association are now receiving from chief constables indicate a considerable addition to this total.

The majority of the signals are of the three-light pattern—red, amber, and green—but there are still one or two instances in which red and green only are used, while at Brighton the traffic at four points is controlled by semaphore signals operated by a constable, the only system of its kind in Great Britain. It is in the position of the lights and the provision of preliminary warnings that there are many variations. In Liverpool the signals are in the middle of the road junction; in Leeds they are on the left-hand side pavement on the near side; in Edinburgh they are on the far side of the junction. A system of electric signalling for pedestrians is also to be introduced at Ludgate Circus shortly.

The Ministry of Transport makes grants to local authorities of 60 per cent. of the cost of erection of automatic traffic signals which conform to the requirements of the Ministry.

Costs of Crop Damage.

A Simple Method of Estimating the Cost of Damage to Crops caused by Line Construction.

By THOMAS A. GEORGE, A.I.E.E.

ABOUT the only compliment an overhead line engineer ever has paid to him by the farming fraternity is concerning his alleged ability to choose the very best field on a farm wherein to erect his poles or the best part of a field for a sub-station site. Just as the farmers vary the method of conveying this purposeful compliment, so do the various claims for damage to crops and grass land fluctuate.

Neighbouring farmers will make widely divergent claims for similar damage to crops of similar nature that can be reckoned to cause considerable worry to anyone who is trying to assess or estimate the cost of damages, and to do a fair deal for both the farmer and supply company or whoever is erecting the line.

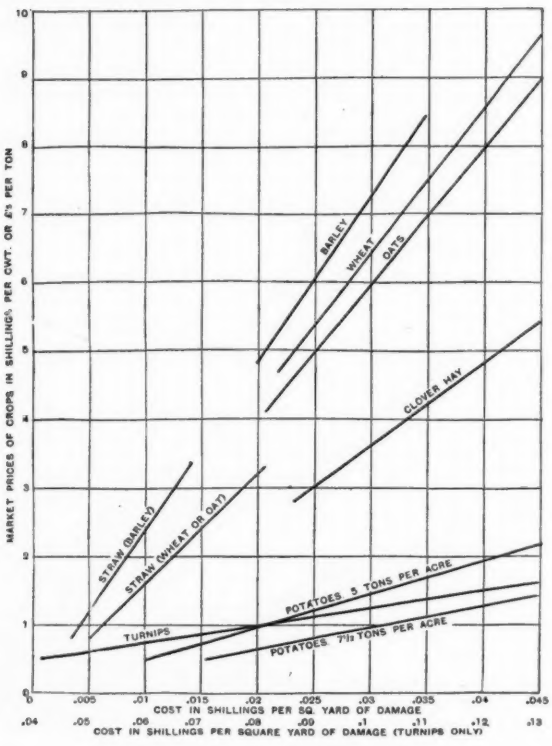

MARKET PRICES OF CROPS IN SHILLINGS PER CWT. OR £'s PER TON
BARLEY
WHEAT
OATS
CLOVER HAY
STRAW (BARLEY)
STRAW (WHEAT OR OAT)
POTATOES 5 TONS PER ACRE
TURNIPS
POTATOES 7½ TONS PER ACRE
COST IN SHILLINGS PER SQ. YARD OF DAMAGE
COST IN SHILLINGS PER SQUARE YARD OF DAMAGE (TURNIPS ONLY)

Fig. 1.—Cost of Damage per Square Yard with Different Crops.

The yield of crops naturally varies with different districts and seasons; on one farm, for instance, a particular field yielded 10 tons of potatoes per acre in one year, yet the next time a potato crop was on that field the yield was only 2 tons per acre. Then again different cereals yield at different rates per acre—oats generally the heaviest and barley the lightest—and even straw varies per acre. Despite all these variable quantities, coupled with price fluctuation, it is possible to have a ready means of comparing the likely cost of damage for various crops or to check off the feasibility of claims.

Damage due to surveys and erection generally follows a well-defined track, somewhere about a yard wide with a fairly constant-sized flattened out area around each pole. If erection takes place after sowing time, the trampled-down section will represent a dead loss to the farmer for the season, although with some cereal crops the loss may extend into the second year or sometimes beyond, as a usual practice is to sow clover or grass mixed with the cereal to crop the second year from sowing and sometimes the third. Arrangements, however, can often be made with farmers, if the erection coincides with planting time, for a track to be left out where the work will take place, and then there is often time to re-plough and plant and get a fairly good growth.

There is one point on which engineers often get to cross purposes with farmers, and that is in regard to the damage to standing hay or corn by survey parties measuring out a prospective line route; great care will be exercised by the party to avoid smashing down the standing crops, and yet a claim for damage results. The farmer is often right in this claim, for very little pushing through a tall growing crop lays it over to such an angle that the cutters of the mowing or reaping machine slide along the stems and lay the plant flat on to the ground instead of cutting it off. It is by no means an

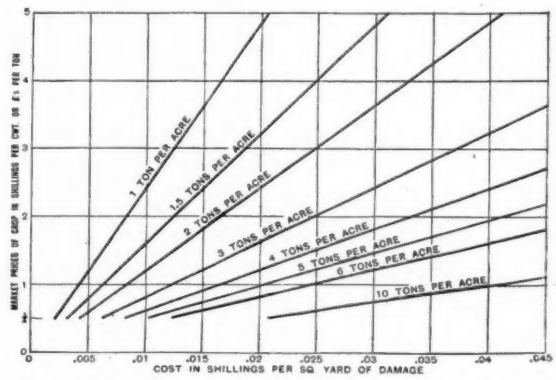

MARKET PRICES OF CROP IN SHILLINGS PER CWT. OR £'s PER TON
1 TON PER ACRE
1.5 TONS PER ACRE
2 TONS PER ACRE
3 TONS PER ACRE
4 TONS PER ACRE
5 TONS PER ACRE
6 TONS PER ACRE
10 TONS PER ACRE
COST IN SHILLINGS PER SQ. YARD OF DAMAGE

Fig. 2.—Cost of Damage per Square Yard with Varying Yields.

uncommon sight, after cutting, to see the route where someone walked through a standing crop a few days before the cutting time marked out by a flattened but uncut track of crop; this is a loss to the farmer as he generally cannot afford to go back over the section with a scythe.

From many years of observation on damages caused by overhead-line construction over a wide area, the most ready method of comparing or estimating claims is from curves which show the cost of damage per yard of track for varying market prices of the crops. These curves (see figs. 1 and 2), which can be extended to cover any exceptional fluctation of price or yield, are based on normal yields for crops averaged over many districts; the yields per acre have been taken as follows:—

Oats	24 cwt. per acre.
Wheat	22½ ,, ,, ,,
Barley	20 ,, ,, ,,
Straw (barley) ...	1 ton ,, ,,
Straw (wheat and oat)	1½ ,, ,, ,,
Hay, clover	2 ,, ,, ,,
Turnips	20 ,, ,, ,,
Potatoes	5 & 7½ tons per acre.

Potatoes may yield as much as 10 tons per acre in some cases, and, although oat straw has been taken at the same yield as wheat straw, yet it generally commands about 10s. per ton more.

Fig. 1 shows all the curves for the above crops worked out in terms of the market prices in shillings per cwt. or £'s per ton for crop against cost of damage in shillings per yard of track per yard wide, or, in other words, per square yard. The great ease with which damage can be worked out from these curves is apparent; for instance, if a track 4 ft. wide has been tramped across a field of oats 100 yards wide, and the price of oats is 6s. per cwt. and oat straw 50s. per ton, then from the curves the cost of oats will be .03s. per yard width of track, and for straw .0155s. per yard width of track, giving a total of $.0455 \times 100 \times 1 \times .33$; this equals 6s. 1d., the cost of the damage. If the field had been clover hay the damage would have amounted to $.035 \times 100 \times 1.33$, which equals 4s. 8d., with, perhaps, a third added for second-crop damage in the next season.

Turnips usually run about eight to the square yard, and at 20 tons per acre yield and a price of £1 per ton are worth 1½d. per dozen, while protatoes at five tons per acre work out at ¼d. per yard of row per £ per ton. For approximate use, £20 per acre is equal to 1.0d. per square yard. These facts may seem trifling, but they enable a very rapid estimation of the cost of the damage done to crops in such cases as alterations to a pole or work done on a drawing stay block to be made.

A curve plotted for cost per ton in £'s or shillings per cwt. against a crop yield of tons per acre is also very useful, as it readily allows the cost for any type of crop to be worked out quickly. Fig. 2 gives curves plotted for yields of from 1 to 10 tons per acre and prices of 10s. up to £5 per ton. Other values are easily obtained by extending the curve or taking some fraction of the values and multiplying up for the final result the figure given by the graph. The heavy yields nearly always refer to root crops.

With such a set of curves as shown in figs. 1 and 2 and the latest market prices as contained in the daily papers, costing of crop damages caused by either overhead or underground construction work or maintenance becomes a simple and definite operation.

Association of Public Lighting Engineers.

Report of the Seventh Annual Conference, held in Leicester from Sept. 8th to 11th.

THE meeting of the Association of Public Lighting Engineers was highly successful from all points of view; the number of members and delegates from the various municipal authorities throughout the country, and from gas and electricity supply undertakings, was up to, if not above, the usual level; the standard of the papers and discussions was good, both from the points of view of the technical man and the layman; and the warmth of the welcome and the hospitality extended by the Lord Mayor and Corporation of Leicester not only enhanced the enjoyment of the visit to the city, but also reflected the increasing importance which Leicester, in common with other cities and towns, is attaching to adequate and scientific public lighting.

On Monday evening, September 8th, the Lord Mayor and Lady Mayoress (Councillor W. E. Hincks, O.B.E., J.P., and Mrs. Hincks) received the members and delegates in the Lord Mayor's Rooms at the Museum Buildings. Mr. S. B. Langlands, of Glasgow (who was the Association's first President and has just retired after having occupied the office for a second year), and Mr. Thomas Wilkie (the new President) accompanied the hosts.

In welcoming his guests, the Lord Mayor recalled that it was almost exactly seven years ago that Mr. Wilkie had come to Leicester from Glasgow) to occupy the position of lighting superintendent, and it was also seven years since the Association was formed. Therefore, the occasion was in the nature of a celebration of two anniversaries.

On Tuesday morning an official welcome was extended to the members and delegates by the Lord Mayor at the Central Fire Station, Leicester. Of the backward position to which street lighting had been relegated in the past, he spoke with some feeling. He said that a factor in the past had been the anxiety of the Finance Committee to ensure that in street-lighting matters nothing should be done beyond that which was absolutely necessary. The position had been much the same in other towns, but he welcomed the new outlook which had been brought about subsequently. Much depended, however, upon the lighting engineers in the various districts.

Alderman J. Hill, J.P. (chairman of the Lighting Committee), joined with the Lord Mayor in extending to the members and delegates a hearty welcome. He also paid a tribute to the Lord Mayor who, when chairman of the lighting committee of Leicester, had laid the foundations of a lighting system which, he believed, would eventually make Leicester one of the best lighted cities in the country. The thanks of the meeting to the Lord Mayor and Alderman Hill for the hearty welcome extended was conveyed by Mr. S. B. Langlands.

The presidential address was taken as read, **Mr. Wilkie** contenting himself with a brief mention of the principal points raised therein. This was followed by a paper entitled "The Practical Use of a Test Room," by **W. L. Marshall** and **R. H. Redmill.** The authors emphasised the need for a test room in every public lighting department, the size and equipment varying with the size of area. They gave details of the apparatus required, with particular reference to the practice at Leicester. They also expressed the opinion that, although laboratory tests were valuable as a preliminary measure, a test under working conditions was necessary after completion of the installation.

In the subsequent discussion, **Mr. C. H. Woodward** (Bournemouth) said that with gas lighting one could not focus, and in that respect electricity had the advantage. In Bournemouth a scheme for the suspension of the lamps centrally in one road had been mooted, but eventually the lamps were erected along the side of the roadway; one of the reasons for that decision was that with central suspension there was glare, because the illumination on the road surface was at a low angle from the eye. With the side lighting there were two bars of light down the road instead of one, and the glare was halved.

Mr. J. F. Colquhoun (lighting superintendent, Sheffield, and a past-president of the Association) discussing the British Standard Specification, took exception to a statement in the paper to the effect that the specification divided roads into eight classes, according to their relative importance, and to the suggestion that a minimum illumination was given for each class. The specification, he said, did not do that; what it did endeavour to do was to classify installations according to their size or character. The specification expressly stated that those classes were used only for reference purposes, and did not necessarily represent the relative merits of the installations. The authors appeared to think it was a mistake to place lamps high, but he would refer them to the tests made at Liverpool recently (recorded in the Association's annual report), in which the mounting height was no less than 40 ft.; the results in that case were excellent.

Mr. G. H. Wilson (G.E.C. Research Laboratories, Wembley) said that he knew of photo-electric photometers which were far more accurate than the visual photometers used in ordinary illumination laboratories. Whilst associating himself with the authors' opinion that uniform brightness on a street surface was desirable in many cases, it was necessary, he pointed out, to use caution, for where the total amount of light available from the light source was small—as, for instance, from a 60-watt or 100-watt lamp—it was preferable to allow the direct light from the lamps to reach the surface of the road, and also to collect and concentrate upon the road surface by means of reflectors the light which otherwise would be directed upwards. A series of experiments, in which lamps were exposed to the air of a smoky industrial city for three months without attention, showed that the total loss of light due to the presence of dirt on the inside surface was the same as that due to the dirt on the outside; that suggested that it was advantageous to seal the lanterns.

Mr. J. K. Brydges, of Eastbourne (Past-President of the I.M.E.A.), agreed entirely with the authors that a service test after the completion of an installation was essential. It was astonishing how much gas mantles deteriorated as the result of fog or sea mists. Non-ventilated fittings could not be used for gas lamps, and with gasfilled electric lamps there must be suitable ventilation in order to allow the lamps to cool. It was not his experience that rain would keep the outsides of globes clean. He suggested that more attention should be given to

the new type of synchronous-motor controlled circuits, which could be depended upon to give regular lighting, and also to the selenium cell. The latter was rather expensive, but in his opinion one of those two systems would knock out the time switch.

Mr. J. H. Clegg (Burnley) suggested that a test room of the kind outlined in the paper would be somewhat expensive for the majority of lighting departments, and that it might be better to establish a central laboratory, conducted by an independent person, for the service of all. Discussing central and diffracted lighting in roadways, he said that generally it had a dazzling effect upon the motorist.

Mr. E. C. Lennox (Newcastle Electric Supply Co.) said that whereas an electric lamp was tested for initial candle-power and length of life, with special regard to efficiency, a gas mantle was tested for initial candle-power and durability, but with no regard to efficiency. The efficiency of the gas burner was not maintained throughout its life; one must give consideration to the effect of the collection of dirt in the gas burner and the necessity for regular adjustment. He disagreed with Mr. Brydges' remarks concerning time switches; there was a considerable number in use at Newcastle, including electrically-wound ones, and they were quite efficient.

Mr. Haydn T. Harrrison thought the paper would be remembered mostly as being one of the first to suggest that the spectrum question entered into the matter of street lighting. A daylight lamp cut out about 30 per cent. of the long wavelengths—the yellow end of the spectrum—and it did to artificial lighting what the clouds did to the sun, *i.e.*, it made the lighting poor. Electric lamps were yellow as compared with the north daylight. When one walked from Trafalgar Square, London, with its "colder" lighting, into Pall Mall, which was illuminated with the old yellow flame arcs, one experienced an utterly different impression—an impression, not of daylight, but of sunlight. Therefore, he could not see why we should try to cut away the yellow rays, or any rays at all, from our artificial light. The electric bulb, being small, collected relatively little dirt, and therefore he would suggest using the lamp only and getting the full efficiency of the original light source.

Mr. W. J. Jeffery (Charing Cross Electricity Supply Co.) said that in the past there had been too little testing in connection with street lighting. The testing of gas liging was as necessary as the testing of electric lighting. With regard to the life of lamps, there was one group of engineers in London running lamps for 3,000 to 5,000 hours; they simply considered the cost of maintenance, and did not worry about the maintenance of efficiency. The modern gas mantle would not give that life. His experience of the maintenance of time switches was that, provided they were used for relatively small units, they were perfectly satisfactory, but for larger sizes—he had in mind 1,500-watt lamps, grouped—he had experienced difficulty. The selenium cell he had found to be satisfactory for about six months' service, but after that it was a failure; he understood, however, that the makers hoped that within the next twelve months they would produce a selenium cell the efficiency of which would remain constant for a longer period. For lamps up to 500 watts, non-ventilated lanterns were perfectly satisfactory, but, from bitter experience, he would not consider using a non-ventilated lantern for lamps of 1,000 or 1,500 watts. He agreed that with 60-watt or 100-watt lamps, or equivalent gas lamps, it was hopeless to try to distribute the light uniformly. He thought it unfortunate that the question of ground-level illumination had been introduced into the B.E.S.A. specification. He preferred to measure the illumination on a horizontal plane 3 ft. from the ground level.

Ex-Bailie MacDougall (Glasgow) made the point that a testing room was also valuable for the education of the public. The test room at Glasgow had been visited by ratepayers, to whom had been demonstrated the effect of proper lighting in streets, shops, homes, and other buildings.

Mr. Redmill, replying to the discussion, said he believed gas fittings could be focussed in the same way as the electrical fittings. Directional glass might be used. He objected, on the ground of inconvenience, to the suggested establishment of a central testing room to serve all. A departmental test room was not very costly. The synchronous-motor method of controlling circuits, in place of time switches, was all right, provided there was not a failure of the supply. He agreed with Mr. Lennox that the testing of the efficiency of gas mantles was a matter which would have to be dealt with. As to uniformity, he said the paper did not refer to uniform "lighting," but uniform "brightness"—and the two were not the same. Brightness depended on the reflection curve of the road, and by compensating for the curvature of the reflection characteristic of the road surface one obtained uniform brightness, which was more to be aimed at than uniform illumination.

After the morning session, the members and delegates were entertained to luncheon at the Grand Hotel, Leicester, by the Lord Mayor.

In proposing the toast of the Association, the **Lord Mayor** recalled that some seven years ago he had attended, as the representative of Leicester, the conference at which the formation of the Association was decided upon. Street lighting had not occupied the position in civic administration that it ought, and if all the authorities throughout the country were working individually, the profession could not possibly achieve the status it should do.

In a tribute to Mr. Wilkie, he said he had improved enormously the status of his department in Leicester, and that was mainly due to the fact that he gave his personal attention to every caller or every letter writer who complained of or praised the street lighting.

By co-operative effort in the Association, the profession had strengthened its position enormously, in enlightening the public as to the importance of its sphere of activities.

The President briefly responded to the toast.

Following the luncheon, the members and delegates witnessed a display of fire-fighting methods and appliances by the Leicester Fire Brigade.

Tuesday afternoon was devoted to the presentation and discussion of a paper on "The Case for Gas in Relation to Public Street Illumination," by **Mr. C. I. Winstone** (Gas Light and Coke Co.) and **Mr. W. A. Bishop** (Croydon Gas Co.). As the title indicates, the object of the paper was to prove that gas could light our modern streets with satisfaction to all. Details of gas-lighting installations were given, and a number of photographs was exhibited, showing the appearance of certain streets by daylight and when illuminated by gas.

Mr. W. J. Jones (Manager of E.L.M.A. Lighting Service Bureau) said that no less than one-third of the total street lighting in the country was electric. During the last five or six years the number of electric standards in use had increased by 100 per cent. Commenting upon a statement by the authors as to the superior ability of gas lighting to penetrate fog, he said he had not yet succeeded in finding a definite piece of evidence that gas penetrated fog any more than did electric light—and his study had included a search of the scientific journals of this and other countries. He agreed, however, that municipal authorities were parsimonious in regard to street lighting. Details of burners were given in the paper in terms of mean horizontal candle-power, mean spherical candle-power, and mean hemispherical candle-power, but it was recognised internationally that the mean spherical candle-power was the only satisfactory method of comparison. He suggested that on the score of intrinsic brilliancy, electric lighting seemed to have the advantage of gas. One could use a 500-watt lamp and still have an intrinsic brilliancy of 25 c.p. per sq. in.—somewhere near half that obtained with the ordinary gas mantle.

The President, commenting upon a criticism made by Mr. W. M. Mason (of the British Commercial Gas Association) of the statement in the presidential address that the gas industry must realise that it was up against competition, said that, before he had recommended electricity rather than gas in the cases mentioned in his address, he had rigged up electric- and gas-lighting installations, as nearly identical as possible, and the results of his tests favoured electricity.

Mr. W. J. Jeffery (Charing Cross Electricity Supply Co.), commenting upon a statement by one of the authors that there were no streets in this country illuminated to Class B standard of the B.E.S.A. Specififfication, said that he had to maintain the lighting on Victoria Embankment under guarantee, as being Class B; he believed that was the only street lighting in the country which was up to Class B.

Early on Tuesday evening many of the members visited the test room of the Leicester lighting department.

Comparative Tests of Street-Lighting Installations.

Late on Tuesday night many of the members acted as observers of a series of comparative tests of different types of electric street lighting in Leicester. In view of the interesting results of the experimental investigation of street lighting carried out at the Sheffield meeting in July, 1928, and the desirability of obtaining further information of a similar character, the Illumination Research Committee of the National Physical Laboratory had suggested these further tests at Leicester, and Mr. Wilkie had co-operated. The general aim of the investigation was to compare different general types of street lighting from the point of view of visibility, glare, discomfort, attractiveness, &c. Each of the fittings employed typified a certain distinctive method of street lighting, no attempt being made to compare the merits of different fittings, which provided street lighting of the same general character. Each of the eight installations consisted of five spans, involving six identical fittings, and all the installations were staggered systems with the same mounting height and road width. To facilitate comparison, the installations were all arranged in a space of about twelve spans. On one stretch of five consecutive spans the posts each carried four different fittings. On a second stretch of five consecutive spans, separated by one span from the first stretch, each post also carried four different fittings, all these being different from the fittings in the first stretch. Thus, by standing in the intermediate span, it was possible, by suitable switching, to see in turn four different installations looking along the road in one direction, and four more in the opposite direction.

The actual tests consisted of comparisons between the different installations taken in pairs. The two installations concerned in a given comparison were switched on and off alternately during a period of about 10 minutes, only one installation being on at one time. During this period the observers were asked to decide by direct observation the answers to a number of questions, indicated on a result card, as to whether objects were seen with greater facility in one installation than in another, whether one was more discomforting than another, and so on. The questions could be answered only by each observer's direct observation of the installations exhibited.

Presidential Address.

By THOMAS WILKIE.

(Abstract.)

Leicester is similar to most other cities in that progress is in direct ratio to the money allocated. The gas and electrical undertakings are both owned by the Corporation; generally speaking, all tramway routes will be electrified and all other roads, except those on new housing estates, will be lit by gas, as at present.

The decision to substitute electricity for gas in main roads was not taken without a good deal of thought. Two streets were selected of entirely similar conditions as to length, breadth, surroundings, &c., and the spacing and height of the units were as near as possible identical. One street was lit by gas and the other by electricity. Two distinct problems were present, *viz.*, efficiency and cost. On the results obtained I had no hesitation in recommending the adoption of electricity. If the gas industry wishes to retain this valuable load it must give better terms. We are its best customers, our load is taken during quiet hours, and we do not create bad debts. We are also rapidly reaching a state of truly automatic lighting by electricity, and this factor alone will reduce still further the maintenance costs of an electrical installation and make the comparison still more unfavourable to gas.

The complete programme at Leicester, which was embarked upon three years ago, is that approximately three miles of tramway route will be re-lit by electricity every financial year and the gas plant released used in improving, first of all, secondary main roads and 'bus routes and then side streets.

The standard which was considered satisfactory for slow-moving traffic is now totally inadequate but the necessity to alter the standard of expenditure has not been so widely acknowledged. It has not yet been recognised that public lighting should be made the statutory duty of all local authorities. Local authorities have not realised the advantages to be gained from putting public lighting in the hands of a qualified lighting engineer, holding an independent appointment, and preferably one who is not actively interested in either gas or electrical undertakings. Many undertakings have not yet realised the immense advantage of retaining the public lighting load by offering special tariffs. Each of the above factors, in almost equal degrees, are retarding the provision of effective public lighting.

The Association, as you all know, was founded seven years ago and was incorporated two years ago. It is represented on the councils and committees of kindred associations, and is assisting the scientific research into the factors, physiological and psychological, which constitute good illuminating engineering. I feel the time has now come when we must set up the following sub-committees: (1) Parliamentary, (2) tariffs, (3) safety, (4) technical. The duty of the Parliamentary sub-committee will be to build up a case for the inclusion in the Public Health Act of such legislation as will make the provision of public lighting a statutory duty and the fixing of a definite maximum rate to be levied for this purpose. A further item which could usefully be dealt with is the possibility, and advisability, of capitalising a portion of the Road Fund revenues for the lighting of arterial roads.

In Leicester a rate of 9d. would represent a cost of 4s. 7d. per head of population per annum (less than the cost of one decent entertainment), or it can be expressed as 1.06d. per head per night (the cost of a box of matches), or as 3s. 3d. per linear yard per annum. Bound up in this question of ways and means is the ultimate use of the B.E.S.A. Specification. Frankly, I feel it has arrived too soon and that, under existing conditions, not one engineer in a hundred could adopt it, but, assuming a more generous financial treatment, I think it would naturally follow that the B.E.S.A. Specification would be accepted as the standard of good public lighting. In Leicester a new arterial road is being made through the centre of the city, and has qualified for a Government grant. Nothing, however, can be obtained towards the cost of lighting; surely that is most illogical.

The tariffs committee would be the medium through which the views of the Association would be brought home to the gas and electrical undertakings. A good deal could be said on this matter of public lighting tariffs, and I am sure it will be to the mutual advantage of undertakings and lighting committees if the question is thoroughly discussed.

The safety committee could probably work best in conjunction with the National Safety First Association. This committee might arrange for local committees to be set up in every city which is represented in our Association and collect exhaustive data relating to street accidents, their causes, and their remedies; the police would, of course, be the most natural and useful allies. The lighting engineer, or other responsible official, should form an integral part of all committees dealing with public safety.

The duties of the proposed technical committee are legion. Public lighting is rapidly approaching the position of an exact science and continual research is necessary, research which is not merely, and purely, research, but research which includes one of the biggest factors so far as lighting engineers are concerned, and that is efficiency with economy.

Moulded Hose Manufacture.

Notes on the equipment of the British Moulded Hose Co., Ltd., introducing a new form of industrial heating load.

AMONG recent examples of large factory installations, that of the British Moulded Hose Co., Ltd., at Watford, is of particular interest, as it incorporates a new form of industrial heating load and also a method, which is believed to be unique in this country, although it is established practice in the United States, for emergency stopping of the mixing mills by dynamically braking the synchronous-induction driving motors. Energy in bulk at 6,600 volts, 3-phase, 50 cycles, is supplied by the Watford Corporation electricity undertaking through a ring-main feeder opened at the factory sub-station, fig. 2, and controlled by a six-panel, truck-type switchboard made by the General Electric Co., Ltd. Protection for the incoming feeders is of the split-conductor type, the relays, made by Messrs. Ferranti, Ltd., being operated by a 50-V d.c. auxiliary circuit obtained from a small motor-generator and secondary battery installed in the sub-station, which also supplies current to the pilot lights and to a skeleton lighting system for emergency use. Owing to the fact that no motors above 150 b.h.p. are installed, the whole of the energy is transformed to 415 volts line pressure through three Crompton Parkinson transformers, each of 750-kVA capacity, which feed the front access cubicle-type E.C.C. switchboard. Transformer protection on the secondary side is by Everett Edgcumbe reverse-power relays connected to the auxiliary battery, and on the primary side by plain overload trips with inverse adjustable time lags.

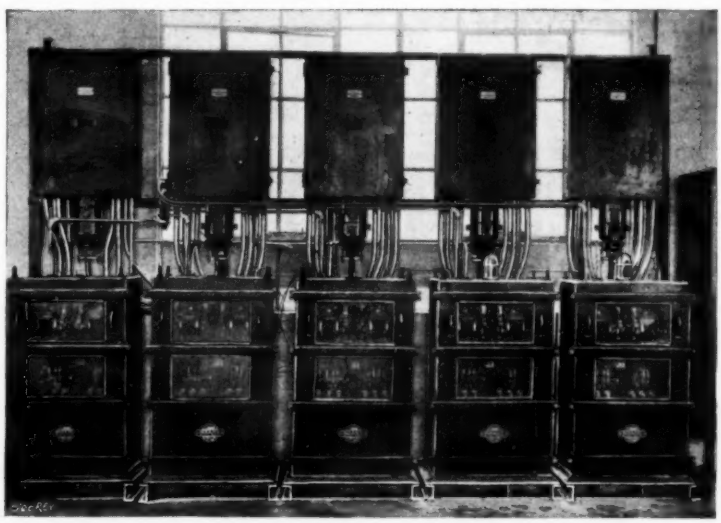


Fig. 1.—Temperature-control Contactors for Vulcanising and Melting Plant.

The distribution scheme is carried out in unarmoured paper cable laid underground in chequer-plate covered trenches or through fibre conduit bedded solid, as rendered advisable by traffic requirements.

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The building comprises six floors, each of which is served by three goods and one passenger lifts installed by Lift and Engineering, Ltd., and with a total floor space of over 3¼ acres. A central well covering about one third of the floor space extends the full height of the building and is roofed with wired glass. The ample headroom available in this well

Fig. 2.—The Factory Sub-station.

renders it admirably suited for the accommodation of the electrically heated lead melting pots, with their large hoppers and overhead scrap-lead conveyor, and the electric vulcanising plant, from both of which a certain amount of heat is liberated.

The factory is devoted entirely to the output of the moulded variety of rubber hose, all grades of which are unkinkable, without the use of metal or other stiffeners, certain types being suitable for air, high-pressure water, spray and oil, in addition to garden hose. Production has been set at 50,000 ft. of the various grades, approximately 10 miles, per 8-hour day, an output which has already been exceeded.

On the ground floor, fig. 3, the rubber compounds are weighed, mixed, refined, and milled, the plant for this purpose being driven by G.E.C. synchronous induction motors controlled by "Brookhirst" switchgear, the novel feature previously mentioned being the absence of any clutch or mechanical brake between the motors and rolls, which, in case of emergency, are stopped without jar or strain practically instantaneously by trip switches which cause the armature windings to be short-circuited through resistances as the supply current is interrupted. Arrangements are made, of course, for the continuance of the field during the stopping period, which latter may be adjusted to requirements. In view of the common practice in this country of securing emergency stopping by means of electric clutches and electro - mechanical brakes, the increased efficiency, smoother action and lower first cost of the present method constitute a notable advance.

The composition of the hose is such that layers of rubber tube alternate with layers of braid, the whole being forced into intimate contact, the rubber layers being amalgamated through the interstices of the braiding by hydraulic pressure at high temperature. The hose is sheathed with lead for the purpose in a similar matter to that employed for paper-insulated cables; it is subsequently stripped by special machines which return the scrap lead to the electric melting pots for further use. The principle of the electric vulcanising plant is based on the substitution of heated fluids at atmospheric pressure for the ordinary system using high-pressure or superheated steam, in such a way that open-top tanks with lever-operated covers may be used, instead of heavy steam-tight autoclaves requiring a considerable amount of time and skilled attention during and between operations. The plant was constructed by the British Electric Transformer Co., Ltd., to the requirements of the consulting engineer to the company, Mr. W. J. Crampton, M.I.E.E.

Consisting of five independent units, of which one is normally held in reserve as a standby, each of 200 kW loading and capable of an individual output of 3,000 ft. of ¾-in. hose per hour, the energy consumption for this production is approximately 30 kWh, and the working is such that with the five units in operation, overlapping of demands and superimposed peak loads are avoided, thus ensuring a good load factor and no disproportionate increase of the maximum-demand charge.

The five vulcanisers and two lead-melting pots, each of the latter being of 18,000-lb. per hour capacity, are provided with individual automatic temperature controls, the relays of which, working on 50 volts d.c., operate the main 3-phase "Igranic" contactors, fig. 1. Change-over switches giving manual instead of automatic control are fitted for emergency or special purpose use, and pilot lights indicate the operation of the contactors. The electric vulcanising plant, for the patent rights of which application has been made, shows the following advantages over the ordinary steam method:—Lower capital, operating, and maintenance costs; automatic control, no skilled attendance being necessary; and speed of operation and uniformity of results.

It is particularly satisfactory to record that production was commenced within two days of the completion of the plant, and has since continued without intermission or curtailment. No changes or modifications have been found necessary. Among other innovations of interest to electrical engineers is an entirely new and simplified type of a.c. motor starter for direct switching, operated by push button, the design of which was hurried forward in order to meet the requirement of a small starter of robust construction which would provide "inching" control more satisfactorily than hitherto obtainable.

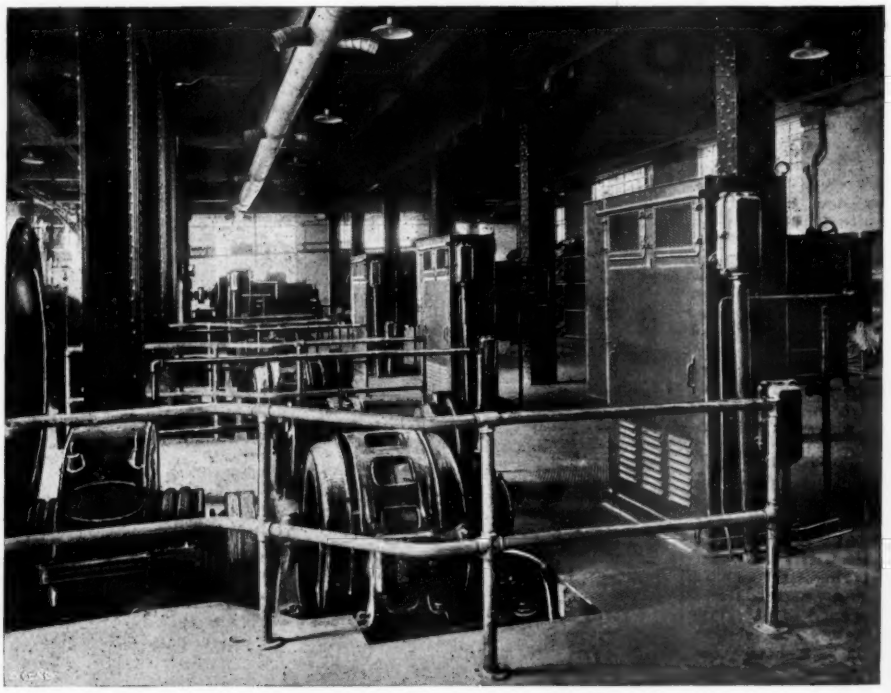

Fig. 3.—Dynamically-braked Auto-synchronous Motors on Ground Floor.

For the facilities which have rendered this article possible acknowledgment is due to the directors of the British Moulded Hose Co., Ltd., and of its associated company the Electric Hose and Rubber Co., of Wilmington, Delaware, U.S.A.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.

A Rumour Denied.

Messrs. Crompton Parkinson ask us to state that there is no truth whatever in the rumours which have gained currency to the effect that they are shutting down their switchgear and transformer department.

Japanese Prince and Princess at Trafford Park.

On Friday last their Imperial Highnesses Prince and Princess Takamatsu visited the works of the Metropolitan-Vickers Electrical Co., Ltd., at Trafford Park, Manchester. After a walk through the principal shops there was a very spectacular display in the million volt laboratory, and at the close the chairman of the company, Sir Philip Nash, presented a specially prepared album of photographs to the Prince. One of the photographs had particular interest for H.I.H. as it was of his brother, the present Emperor, when as Crown Prince in 1921 he visited the same works. The visitors saw on test a 27,000-kW turbine for Kyushu, and a 25,000-kW generator on the electrical test bed, also for Japan. We have received an interesting group photograph taken on the occasion in the large electrical machine aisle.

Japanese State Telephone Service.

The Japanese Government has recently approved tentative plans proposed by the Minister of Communications, to form a semi-government organisation with a capital of £80,000,000, of which half will be subscribed by the public while the State estimates that its present equipment and business is worth the other half of the amount—to take over the operation of the Japanese State telephone service. The main features of the scheme are: (1) Jurisdiction and administration of telephones to rest with the Government as heretofore. (2) A semi-government concern, empowered to build, extend and maintain telephones to be established, of the shares of which the Government shall be the custodian. (3) The shares to be widely subscribed by the general public, so that public ownership of this utility may be brought home to the minds of the people. (4) Without drawing on the national treasury, the extension of telephone lines to be accelerated, with the view to placing telephones within the reach of all. (5) The dividends on the Government's shares and the business profit taxes to be levied on the new concern will equal the present telephone revenue of £5,300,000 to the national treasury. The subsequent steady increase of telephone users will, it is anticipated, enable the concern to earn a net 8 per cent. margin of profit. The aim of the new project apparently is to let the public contribute part of the funds and share in the promotion of the telephone service. A bill has, however, to be introduced to the Diet for sanction before the proposed semi-official corporation can be established.

Unemployment.

The number of persons on the registers of the employment exchanges in Great Britain on September 1st was 2,060,444, an increase of 20,742 as compared with the figure for August 25th (2,039,702); the number on September 2nd, 1929, was 1,152,260. It is estimated that at August 25th, 1930, there were approximately 9,548,600 insured persons aged 16 to 64 in employment in Great Britain. This was 36,100 less than a month before and 726,100 less than a year before.

Aluminium Works in Jugo-slavia.

It is stated that with the aid of German capital it is proposed to erect works for the production of aluminium in the vicinity of Mostar, Herzegovina, which will have an annual power consumption of 120,000,000 kWh. The power will be supplied by the State coal mines in Mostar.

Selling Campaigns.

A folder has been issued by the Ever-Ready Co. (Great Britain), Ltd., Hercules Place, Holloway, N.7, giving details regarding its selling week, from September 22nd to 27th. The principal feature of the campaign will be a window display competition for substantial prizes; the company is offering to supply dealers with display material.

A comprehensive selling campaign has recently been launched by Messrs. Rd. Johnson, Clapham & Morris, Ltd., of Manchester, for all classes of wireless, flash lamp, torch and pocket lamp batteries. The Jacem high-tension battery is manufactured in voltages from 60 to 100, in either standard or double capacity; it is of British manufacture; and case lots of 500 batteries are supplied.

E.C.A. Visit to Witton.

On September 10th members of the Western Section of the Electrical Contractors' Association paid a visit to the works of the General Electric Co., Ltd., at Witton. The party numbered 150. In the afternoon at the Magnet Works in Landor Street, Birmingham, various domestic appliances were inspected. The company entertained the party to luncheon, Mr. W. H. Heaton, works manager, presiding, and the thanks of the visitors were accorded by Mr. W. B. Williams, chairman of the Section, and the Lord Mayor of Cardiff, Alderman W. Charles.

Aluminium Production.

According to statistics compiled by the Metall Gesellschaft of Frankfort-on-Main, the world's production of bauxite in 1929 amounted to 1,870,000 metric tons, as compared with 1,800,000 metric tons in the previous year, the increase having taken place mostly in France, which raised 643,000 metric tons as against 598,000 metric tons in 1928. Of the total production a quantity of 1,050,000 tons was applied to the manufacture of aluminium as contrasted with 970,000 tons in 1928. The output of aluminium increased in the United States from 95,000 tons in 1928 to 102,000 tons last year, and in Italy from 3,600 tons to 7,000 tons in the two years respectively. The consumption of the metal specially increased in England, namely, from 17,000 metric tons to 30,000 tons, in the United States from 120,000 tons to 130,000 tons, and in Italy from 4,200 tons to 9,300 tons last year. The production of aluminium in Germany is stated to have risen from 31,700 metric tons in 1928 to 32,700 tons last year; the exports increased from 3,600 tons to 4,100 tons; the imports decreased from 14,800 tons to 14,200 tons; while the consumption remained at 39,000 tons in the two years respectively.

British Trade with Australia.

In view of the approaching Imperial and Economic Conference, the British Council of the Australian Association of British Manufacturers, through its chairman, Sir Arthur Balfour, has presented a memorandum to the Secretary of State for the Dominions, emphasising the grave effect which the present economic situation in Australia has upon British trade, and putting forward suggestions for its amelioration, to the advantage of both countries.

For Sale.

The West Central Merchandise Mart is to sell by auction at York House, Theobald's Road, London, W.C.1, on Thursday, September 25th, the stock of an electrical and wireless factor now in liquidation.

(See our advertisement pages to-day.)

Kye Electric Lamp Publicity.

From the BRITISH ELECTRIC TRANSFORMER CO., LTD., of Wellington House, Strand, London, W.C.2, we have received particulars and photographic prints of a number of window and other display cards and posters that they have issued for advertising their Kye electric lamps. This part of their "Cheaper Lamps" campaign—"The Big Kye Sales Drive"—which includes national and provincial Press advertising, showcards and window bills, and illustrated leaflets, booklets, and counter bills. Overprinting for the trade is arranged for. One of the examples mentioned is a complete window display executed in red, blue, orange, and black, and it will be placed in the trader's window by a professional window dresser. Another

is a large display card which can be used as the centre-attraction of a composite window display. There are also a coloured window bill, 11 in. by 24 in.; a showcard, 14¾ in. by 9¾ in.; an envelope size folder, and a catalogue for dealers giving full details of the entire range of Kye lamps. All of the display examples before us bear a prominent intimation that the lamps are British made, but perhaps their most outstanding and striking feature is the price at which the lamps are offered.

The Radio Apparatus Market in Siam.

A confidential report on the market for radio apparatus in Siam has been prepared by the Department of Overseas Trade from information furnished by H.M. Consul-General at Bangkok and has been issued to firms whose names are entered on its Special Register. United Kingdom firms desirous of receiving a copy of this report, together with particulars of the Special Register service of information and form of application for registration, should communicate with the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. Reference B.X. 6740 should be quoted.

Repulsion Motors.

With reference to the recent discussion that has taken place in our "Correspondence" columns, Messrs. Berkeley & Young inform us that they manufacture both classes of repulsion motor referred to. They advise us that they have manufactured for 20 years the type of motor with only one winding on the rotor and a commutator that is short-circuited as soon as a pre-determined speed is reached.

Generating Plant for Lettonia.

It is reported that the Electricity Company (late Lahmeyer), of Frankfort-on-Main, has submitted a detailed scheme to the Government of Lettonia in regard to the construction of a large generating station at Dole in the neighbourhood of Riga. The plant would have a capacity of between 40,000 and 50,000 kW and would involve an outlay of between 50 and 60 million lats. It is stated that the Government is seeking the interest of other foreign firms in the matter, although the definite conditions have not yet been settled.

The Buenos Aires Exhibition.

General Uriburu, Argentine Government, has authorised the British authorities connected with the above exhibition, to state that the latter has the approval and will enjoy the support of his Government. The Minister of Finance expressed in similar cordial terms his goodwill and desire to assist in every way possible, emphasising the importance of British commercial relations with the country.

The Argentine Ambassador has informed *Reuter's Agency* that the recent events in Argentina will in no way affect the British Empire Trade Exhibition which is to be held next March in Buenos Aires, and that there is not the slightest occasion for any misgiving as to the change of the situation having any prejudicial effect on its success. The Provisional Government has already declared its sympathy with this exhibition, and the numerous facilities which have already been accorded will be strictly observed.

Buenos Aires Institutions.

Mr. Louis Greaven, the general secretary of the Centre of British Engineering and Transport Institutions, informs us that the address of the Centre moved in June to new and permanent premises at Sarmiento 1236, (4th floor) (Prince George's Hall Building), Buenos Aires. The Institutions located at this Centre are: The Buenos Aires Association of the Institution of Civil Engineers; the Institution of Mechanical Engineers (River Plate Branch); Institution of Electrical Engineers (Argentine Local Centre); Institution of Locomotive Engineers (South American Branch); the Association of British Engineers in the Argentine Republic; the Institution of Railway Signal Engineers (South American Branch); and the Institute of Transport (Argentine and River Plate Centre).

New Greek Company.

With the title of the Galileo Co. a new concern has recently been formed in Athens with a capital of 100 million drachmae (about £266,670) to establish and work electricity supply undertakings in the Balkans. The General Trust, the Compagnie Italo-Belge pour Enterprises Electriques, the National Bank of Greece, and the Italian-Greek Commercial Bank are all interested in the new undertaking.

Recent Contracts.

A Royal decree is expected to be published shortly confirming a contract placed by the Italian Government with the Societa Italiana Reti Telefoniche Interurbane, an affiliated company of the International Standard Electric Corporation, for the South Italian Toll Cable from Naples to Sicily, at a cost of $11,400,000. The national telephone cable network of Italy was commenced in 1924, with the Milan-Turin-Genoa network now being completed by the S.I.R.T.I., and will consist of 2,800 km. of loaded cable with 225,000 loading coils and 39 repeater stations, with a total of 1,800 repeaters. The present contract provides for the installation of loaded cable with the necessary repeater stations between Naples and Palermo with extensions to Bari on the Adriatic Coast and Messina and Caltanissetta in Sicily, a total of 1,200 kilometres of cable, 663 loading coil pots containing over 47,000 coils and 17 repeater stations with 350 telephone repeaters. This also includes the submarine cable across the Straits of Messina. The entire cable and a large part of the accessory apparatus will be manufactured in Italy, and installed by S.I.R.T.I. following the designs and specifications of the International Standard Electric Corporation. The completion of this great project will occupy the combined efforts of the various manufacturing companies associated with the International System in Italy for several years.

According to statements made by the Russian trade delegation, which visited Glasgow, an order to the value of £100,000 for the Soviet Government has been placed with Messrs. MAVOR & COULSON, Glasgow. The order is mainly for coal cutting and other mining machines.

Complete electrical equipment for 50 tramcars for the Leeds Corporation tramways has been ordered from THE GENERAL ELECTRIC CO., LTD., and the company's standard apparatus is being supplied. Each equipment consists of two G.E.C. standard traction motors, type W.T.28.S, each developing 50 h.p. on the one-hour rating, 500 V two-drum type controllers (for series-parallel control) arranged for rheostatic braking, circuit breakers, current collector gear, and resistances.

The Canadian Minister of Railways has announced the award of important contracts for power equipment for the large grain elevator at Churchill. Messrs. C. A. PARSONS & CO., LTD., Newcastle, are to supply the equipment for the generating room. Good progress is reported in the development work at Fort Churchill, which will be open for transport operations in 1931.—*Reuter's Trade Service* (Ottawa).

New Showrooms at Surbiton.

New electrical showrooms are to be inaugurated on September 30th at Electricity House, 22, Claremont Road, Surbiton.

Men Displaced by Rationalisation.

The Times reports that the Walsall Town Council on September 15th accepted an invitation to assist in administering the fund established by Messrs. Stewarts & Lloyds, Ltd., tube manufacturers, Glasgow. The firm has allotted £5,000 to assist workmen over 60 who may suffer hardship through the company purchasing the local tube works and closing it down under a scheme of rationalisation.

The Shop and Display Lighting Campaign.

The Hammersmith electrical contractors met at the Town Hall on September 4th, Mr. George C. Law, the Council's deputy electrical engineer, presiding. Mr. Anderson, of the Electric Lamp Manufacturers' Association, gave an address on shop lighting and outlined the E.D.A.-E.L.M.A. Shop and Display Lighting Campaign proposals. It was agreed to form an E.D.A. Circle with Mr. Law as chairman and Mr. R. A. Blake, Electricity Works, No. 85, Fulham Palace Road, W.6, as honorary secretary.

Patent Restoration.

The *London Gazette* reports that an Order was made on September 5th restoring letters patent No. 263,800 granted to Charles Louis Hamel for an invention entitled "Methods and means for the repetition of telegraphic signals."

Book Notices.

"Electrical Power Transmission and Interconnection," by C. Dannatt and J. W. Dalgleish. Pp. xi+424; figs. 112. London: Sir Isaac Pitman & Sons, Ltd. Price 30s. net.

"The Economic Task," by W. Tudor Davies, B.A., barrister-at-law. London: Bertram Evans, Ltd. Price 1s.—The foundation of continuous employment consists in orders; thrift is essential in order to reduce our burden of debt; we are not paying our way because of the shrinkage in volume and price of our manufactured products. These are the ideas expressed in the foreword, but the writer is not a pessimist; he believes that Britain as an industrial nation, will again lead the world if everybody co-operates. He discusses many matters forming part of our great ecomonic task in an interesting way, including the new mentality in industry which is "working towards an international industrial world State"; Statesmanship and Empire, four alternative ideas being discussed; the new economic order; Governmental guidance; internationalism and finance; the business man and internationalism; unemployment; internationalism and the economic situation; and economic re-adjustment.

Trade Announcements.

Mr. F. V. LAMBERT has opened new showrooms at 31, Harmer Street, Gravesend, and he wishes to receive catalogues of electric fires, domestic appliances, and wireless goods.

Messrs. GASKELL & GARRAWAY, LTD., electrical and general engineers, Taunton, have opened new premises in Bridge Street.

Messrs. REDFERN, electrical engineers, of Gainsborough, announce that they have disposed of their premises at 26, Spital Terrace. The firm will continue the business at their other premises at 138, Church Street.

Messrs. PARTRIDGE, WILSON & CO., have moved to new premises at Davenset Works, Erington Valley Road, Leicester.

Bankruptcy Proceedings.

WILLIAM MANN, 32, Briton Street, late 128, Evington Road, both Leicester, wireless dealer.—The first meeting of the creditors interested herein was held at the Official Receiver's Office, 1, Berridge Street, Leicester, on September 11th, when a statement of affairs was submitted which disclosed liabilities of £331 and assets of £18, thus showing a deficiency of £312. The debtor attributed his failure to "loss on sale of wireless business owing to depreciated stock, insufficient turnover, and ill-health." The case being a summary one was left in the hands of the Official Receiver, as trustee.

R. SMITH & D. A. SMITH (D. A. Smith & Co.), wholesale wireless dealers, 41, Skerton Road, Old Trafford, Manchester. —Receiving order made September 4th on a creditor's petition.

H. E. DAFT, electrical engineer, 31, Eastfield Road, Peterborough.—Last day for receiving proofs for dividend, September 24th. Trustee, W. J. Adnitt, Oriel House, New Road, Peterborough.

J. CROOK (W. & J. Crook), wireless engineer, 5, Crosby Street, Atherton.—First and final dividend of 4s. 9d. in the £ payable on September 22nd at the Official Receiver's offices, Byrom Street, Manchester.

Company Liquidations.

BOWYER-LOWE CO., LTD., Radio Works, Letchworth, Herts. —Under the compulsory liquidation of this company, which was formed to carry on business of manufacturers of high-grade wireless, the statement of affairs shows liabilities of £22,759, of which £17,784 is unsecured, and assets £9,159, whilst as regards shareholders there is a deficiency of £13,824. The following are the principal creditors:—

	£		£
Aluminium Co., Ltd.	120	Letchworth Printers, Ltd.	25
Bakelite, Ltd.	75	L.N.E. Railway ...	58
British Insulated Cables, Ltd.	23	Marconi Wireless Telegraph Co., Ltd. ...	864
Bromley-Langton Co.	44	Morrison Polexfen and Blair, Ltd.	24
Burndept Wireless (1928), Ltd.	99	Mullard Wireless Service Co., Ltd.... ...	719
H. W. Chapman, Ltd.	21	McKecknie Bros., Ltd.	64
Chloride Electric Storage Co.	61	P. Ormiston & Sons	22
Coquantion & Co., Ltd.	24	Ormond Engineering Co., Ltd.	107
Dallon Lambert & Co.	132	Pinchin Johnson & Co.	61
Davie Parsons & Co.	78	Recordaphones, Ltd. ..	12,611
Ediswan Electric Co.	146	J. Sankey & Sons, Ltd.	23
First Garden City, Ltd.	265	V. Siviter Smith & Co.	363
Farmer Stedall & Co.	26	Telegraph Condenser Co., Ltd.	89
General Electric Co....	22	Trelleborgs Ebonite, Ltd.	21
Grosvenor Battery Co.	110	Venista, Ltd.	27
—. Hewitt	46	Major R. A. Yearsley	65
H. Hurst	141	Preferential creditors .	332
Jaffe & Co., Ltd. ...	31		
Johns, Son & Watts, Ltd.	22		

SHOCK PROOF, LTD., electrical engineers, 62, Mulberry Street, Hulme, Manchester.—A meeting of the creditors was held on September 10th at Manchester, when a balance sheet as at September 9th last was presented which showed gross liabilities of £3,339. On the assets side the selling rights of patents and goodwill stood at £1,250; plant and machinery, £419; fixtures and fittings, £74; stocks on hand, £248; sundry debtors, £314; formation expenses, £91; whilst there was a debit on profit and loss account of £943. The latter represented the loss on trading from April 27th, 1929, to September 9th last. It was stated that the company carried out a lot of experimental work, whilst the present position had been brought about through bad trade. An offer was made of 6s. 8d. in the £ payable within 14 days, and the creditors decided to appoint Mr. J. Rimington, accountant, of Stockport, as liquidator, with a committee of inspection. The liquidator was given power to re-sell the assets for a sum sufficient to pay 6s. 8d. in the £.

A. J. WILSON & Co,, LTD.—A meeting of members will be held at 8, Staple Inn, Holborn, W.C.1, on November 9th to receive an account of the winding up of the company by the liquidator, Mr. A. E. Tilley.

SPHINX ELECTRIC, LTD.—Winding-up order made September 10th, 1930.

COOK'S WIRLESS CO., LTD.—Winding up voluntarily. Liquidator, Mr. L. Ensor, 32, Museum Street, Ipswich.

TELEVISION, LTD. (the original company formed in 1925).—Winding up voluntarily. Liquidators, Mr. F. Rowland, 76, Finsbury Pavement, E.C., and Mr. H. J. Whitcomb, "Toberonochy," Hampton-on-Thames.

Dissolution of Partnership.

A. R. SMITH & SONS, electrical engineers, 8, King Street, Leicester.—Mr. A. R. Smith, Mr. G. Jackson and Mr. F. G. Shaw have dissolved partnership. Mr. Smith and Mr. Jackson will continue to carry on the business and will attend to debts.

Meetings of Creditors.

ORAVOX, LTD.—A meeting of creditors will be held at 26, Langham Street, W.1, on September 26th, for the purpose of nominating, if thought fit, a liquidator and appointing a committee of inspection.

WORK METERS, LTD.—A meeting of creditors is called for October 3rd at the offices of Messrs. Denton Bros., Brewery Street, Dalton Lane, Keighley, for the purpose, if thought fit, of nominating a liquidator and a committee of inspection.

New Catalogues and Lists.

BULPITT & SONS, LTD., Swansea Works, Birmingham.—A catalogue of electric cooking appliances, including a special range of flat-bottom utensils; particulars are also given of a new low-priced car engine heater.

GEORGE COHEN, SONS & CO., LTD., 600, Commercial Road, London, E.14.—The September issue of the bi-monthly staff magazine.

T. BAXTER, LTD., 36, Great Eastern Street, London, E.C.2.—List 70 dealing with batteries, torches, wireless apparatus and electrical novelties.

POWER HOUSE COMPONENTS, LTD., Albion Chambers, King Street, Nottingham.—A leaflet describing the Wayne "baby" self-winding electric cable reel.

SIEMENS BROTHERS & CO., LTD., Woolwich.—A new "Full-o'-Power" booklet giving particulars of several new and original types of Siemens batteries which have been introduced recently.

PHILIPS LAMPS, LTD., 145, Charing Cross Road, London, W.C.2.—The August issue of the "Philips' Announcer."

ATELIERS DE CONSTRUCTIONS ELECTRIQUES DE CHARLEROI, 56, Victoria Street, London, S.W.1.—The September stock list of a.c. and d.c. motors, transformers, circuit-breakers, &c.

THE ELECTRICAL EQUIPMENT & CARBON CO., LTD., 107-111, New Oxford Street, London, W.C.1.—List B.T.4. giving details of "Elin" bell transformers, transformer bells and buzzers.

THE MARCONIPHONE CO., LTD., 210-212, Tottenham Court Road, London, W.1.—A copy of the September issue of "Radio" and a poster in connection with it.

ALAN WRIGHT, 117, Victoria Street, London, S.W.1.—The new season's list of electric fires, drawing attention to a substantial reduction in prices.

BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, W.C.2.—A quantity of literature giving particulars and reduced prices of "Mazda" lamps, and drawing attention to the company's Press advertising campaign, with illustrations of showcards and an illuminated cut-out display for distribution to dealers as sales aids.

THE EDISON SWAN ELECTRIC CO., LTD., 123/5, Queen Victoria Street, London, E.C.4.—Folders and catalogues dealing with the Ediswan three-valve radio receiver (R.565), Mazda radio valves (R.570 and R.571), vacuum cleaners (T.H.579), laundry equipment for commercial (T.H.580) and home use (T.H.581), the complete range of Ediswan Royal lamps (L.572) and "X-ray" reflectors for shop window and showcase lighting (C.L. 578).

A. W. BEUTTELL, LTD., 96, Victoria Street, London, S.W.1. —The 1930 "Linolite" catalogue announcing a reduction in prices of "Linolite" lamps and illustrating strip reflectors for all purposes.

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.—Booklets on "Magnet" cookers (D.5362) and cooking equipment for hotels and restaurants.

HEYES & CO., LTD., Wigan.—The September issue of the *Wigan Review* containing a description of the "Wigan" well glass fittings and flameproof prismatic bulkhead fittings.

BEST & LLOYD, LTD., Handsworth, Birmingham.—Publication No. 173, containing 63 pages of excellent photographs and description of every type of architectural lighting.

STANDARD TELEPHONES & CABLES, LTD., Columbia House, Aldwych, London, W.C.2.—An interesting booklet, entitled "Better Communication," on private automatic telephone systems.

A. REYROLLE & CO., LTD., Hebburn-on-Tyne.—Pamphlet No. 182, describing the company's system of split-conductor protection for the automatic isolation of faulty cables.

Calendar blotters for September have been received from Messrs. S. ROGERS & CO., LTD., 15, Fitzroy Street, Tottenham Court Road, W.1, and Messrs. MAVOR & COULSON, LTD., 47, Broad Street, Glasgow.

G. A. HARVEY & CO. (LONDON), LTD., Woolwich Road, London, S.E.7.—An excellently produced catalogue (No. 464), containing nearly 200 pages of illustrations and descriptive matter dealing with "Marco" perforated metals.

CAMBRIDGE INSTRUMENT CO., LTD., 45, Grosvenor Place, London, S.W.1.—List No. 161, dealing with a.c. instruments for supply frequencies, and list No. 173, describing the "Grassot Fluxmeter," an instrument for use in magnetic testing.

STURTEVANT ENGINEERING CO., LTD., 147, Queen Victoria Street, London, E.C.4.—Catalogues Nos. 1096 and 1097 dealing with wood dust and general dust-collecting systems, respectively.

George Ellison, Ltd., Perry Barr, Birmingham.—A well-illustrated brochure on the industrial applications of small circuit-breakers and starters.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, London, E.C.1.—Catalogue UE, section 5, giving particulars of terminal boxes including a new range of e.h.p. outdoor inverted type. Also leaflets announcing a reduction in the prices of rubber-insulated wires, cables, and flexible cords.

Nivex Gauge, Ltd., Tipping Street, Ardwick, Manchester.—Particulars of the "Nivex" vest-pocket detectoscope and a leaflet describing the "Runbaken" repair and spare service.

Porn & Dunwoody, Ltd., 72-78, Fleet Street, London, E.C.4.—Pamphlets dealing with Diesel engines, generators, &c.

J. A. Crabtree & Co., Ltd., Lincoln Works, Walsall.—The new electrical accessories catalogue (No. 6) is an excellently produced publication containing 176 pages of matter dealing with all kinds of switches, plugs, sockets, lampholders, adapters, bell-pushes, &c. In addition to full-size colour illustrations there is a unique system of indexing which may be used from the front or the back and remains visible when referring to any section of the book.

The Rothermel Corporation, Ltd., 24 and 26, Maddox Street, London, W.1.—The new season's catalogue of radio, auditorium, public address and talking-picture equipment.

Standard Battery Co., 184/188, Shaftesbury Avenue, London, W.C.2.—Folders dealing with the new season's radio apparatus, gramophone pick-ups, batteries, and testing equipment.

Higgs Motors, Witton, Birmingham.—A large size reproduction of a letter referring to various types of electric motors.

The Electro-Mechanical Brake Co., Ltd., Moor Street, West Bromwich.—Catalogue E.200, giving particulars of EMB steel case reversing controllers.

Messrs. Crompton Parkinson, Ltd., Guiseley.—Circular giving particulars of the company's organisation and manufactures in Australia, bearing on the front page the title "Australian-made plant pays no tariff." Also a well-illustrated publication on the "L.S." range of induction motors.

Prices of Materials.

The following prices are only general, and they may vary according to quantities and other circumstances :—

	CHEMICALS, &c.	Price Sept. 16th	Fortnight's inc. or dec.
a	Acid, Oxalic ... ... per lb.	5¾d.	...
a	Ammoniac, Sal ... ... per ton	£60	...
a	Ammonia, Muriate (large crystal) ,,	£52	...
a	Bisulphide of Carbon ... ... ,,	...	...
a	Borax ... ... ,,	£17	...
a	Copper Sulphate ... ... ,,	£25 10s.	...
a	Potash, Chlorate ... . per lb.	3d. to 4d.	...
a	,, Perchlorate ... ... ,,	5½d.	...
a	Shellac ... ... per cwt.	£13 10s.	...
a	Sulphur, Commercial ... ... ,,	£11	...
a	,, Roll ... ... ,,	£11	...
a	Soda, Chlorate ... ... per lb.	3d.	...
a	,, Crystals ... ... per ton.	£5 to £5 5s.	...
a	Sodium Bichromate, casks ... per lb.	3¾d.	...
	METALS, &c.		
b	Aluminium, Ingots ... ... per ton.	£95 to £100	...
b	,, Wire ... ... per lb.	1/1 to 1/9	...
b	,, Sheet ... ... ,,	1/1 to 2/9	...
p	Babbitts Metal and Anti-friction Metals—		
	Grade I ... ... per ton net.	£130	...
	Grade II ... ... ,, ,,	£93	...
	Grade III ... ... ,, ,,	£56	...
c	Brass (rolled metal 2' to 12' basis) per lb.	8¾d.	...
c	,, Tubes (solid drawn) ... ,,	10½d. to 10⅝d.	...
c	,, Wire, basis ... ... ,,	8¾d.	...
c	Copper Tubes (solid drawn) ... ,,	11½d.	...
g	,, Bars (best selected) ... per ton	£79	...
g	,, Sheet ... ... ,,	£79	...
g	,, Rod ... ... ,,	£79	...
d	,, (Electrolytic) Bars ... ,,	£52 2s. 6d.	...
d	,, ,, Sheets ... ,,	£143 10s.	...
d	,, ,, Wire Rods ,,	£62 2s. 6d.	...
d	,, ,, H.C. Wire per lb.	8d.	...
f	Ebonite Rod ... ... ,,	2/3 to 2/6	...
f	,, Sheet ... ... ,,	2/3 to 2/6	...
n	German Silver Wire ... ... ,,	2/2	...
h	Gutta-percha, fine ... ... ,,	nom.	...
h	India-rubber, Para fine ... ... ,,	6½d.	¼d. dec.
i	Iron, Pig (Cleveland No. 3.) ... per ton.	75/6	12/1½ inc.
l	,, Wire, galv. No. 8. P.O. qual. ,,	£20	...
g	Lead, English pig ... ... ,,	£19 10s.	...
g	Mercury ... ... per bot.	£22 10s. to £22 15s.	...
e	Mica (in original cases) small ... per lb.	6d. to 8/-	...
e	,, ,, medium ,,	4/- to 8/-	...
e	,, ,, large ... ,,	10/- to 20/- & up	...
p	Phosphor Bronze, plain castings ,,	1/1¼d.	...
p	,, ,, drawn bars & rods ,,	1/1d.	...
p	,, ,, rolled strip & sheet ,,	1/1¼d.	...
p	,, ,, wire ... ... ,,	1/1¾d.	...
o	Platinum ... ... per oz.	£6 10s.	10s. dec.
d	Silicium Bronze Wire ... ... per lb.	9¾d.	...
r	Steel, Magnet, in bars ... ... ,,	7½d.	...
g	Tin, Block (English) ... ... per ton	£135 10s. to £136 10s.	10s. inc.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	3/2	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

Reporting on the lead market on September 13th, Messrs. James Forster & Co. stated that the general position remained unchanged, with a sufficiency of supplies, a fair consumption, and prices still closely under control. There was nothing in sight to alter this condition of affairs. In Germany demand was still very poor, while in the U.S.A. only moderate demand was being met with. Under the circumstances lead seemed fully valued at the present price. The Board of Trade returns for August were :—Imports 22,574 tons, exports 5,258 tons, leaving 17,316 tons for home consumption.

Lighting and Power Notes.

Aberdeen.—Proposed Price Reduction.—The Corporation Electricity Committee has decided to recommend the following reductions in the charges for electricity, as from the December meter-readings :—Lighting : From 4½d. to 3½d. per kWh. Lighting, for consumers using 4,000 kWh or over per half year : 6½d. per kWh (7d. present price) for the first hour daily of the maximum demand and 1½d. per kWh (present rate, 2d.) for all subsequent supply. Slot-meter supply : An equivalent of 5d. per kWh. Power : First 125 kWh per quarter, 3d. per kWh (present rate 3½d.); next 125 kWh, 2d. (2½d.); next 1,250 kWh, 1½d. (no change); next 3,500 kWh, 1d. (1¼d.); all over 5,000 kWh, ¾d. (no change). Two-part domestic tariff : A fixed charge of 10 per cent. (present rate 12½ per cent.) of the rateable value of the premises (minimum of £2 per annum), plus ½d. per kWh consumed.

Australia.—Sydney.—The City Council has decided to spend £170,000 on the laying of a 33,000-V cable to connect Bunnerong with Five Dock sub-station.

Blairgowrie (Perthshire).—Street Lighting.—The Town Council has approved generally a proposal to convert the street lighting of the burgh from gas to electricity. The Grampian Electricity Supply Company is to lay an underground cable, the agreement being for 15 years with an opportunity for revision at the end of every five years.

Carlisle.—Change-over.—The Corporation Electricity Committee has obtained sanction from the Unemployment Grants Committee, for grant purposes, to the change-over from d.c. to a.c. in certain streets, at a cost of £6,500.

Loans.—Sanction to loans of £15,000 for mains and services, £5,000 for plant and kiosks, and £5,000 for consumers' wiring installations has been received by the Electricity Committee.

Continental.—France.—A new hydro-electric power station having a capacity of 36,000-kVA has recently been completed in the Beneyte Valley by the Société Hydro-Electrique de la Diège. The generating plant, which works under a head of 430 ft., comprises four Escher-Wyss Francis-type 9,000-h.p. turbines coupled to 5,000-V alternators running at 500 r.p.m. A feature of the generators is that they are each fitted with four piston-type brakes operated by compressed air sufficiently powerful to bring the machines to rest in less than five minutes. The brakes can be put into operation either close to the machines or from the switchboards. The power generated is stepped up for transmission purposes to 70,000 V by four 9,000-kVA oil-cooled transformers, there being also three 1,500-kVA 5,000/20,000-V transformers.

Crewe.—Mains Extensions.—The Town Council has applied for sanction to a loan of £6,000 for the provision and laying of l.p. distributing mains in 120 streets.

Derby.—Year's Working.—In his report on the operation of the Corporation electricity undertaking during the year ended March 31st last, Mr. G. H. Lake, the borough electrical engineer, states that there was a total revenue of £214,855, as compared with £211,093 in the preceding year. The gross working expenses (including £3,500 for the maintenance of apparatus on hire) amounted to £99,772 as against £87,691, leaving a gross profit of £115,083 (£123,402). After making provision for capital and other charges there was a net surplus of £21,437, as compared with £42,672 in 1928-29, the reduction being due to a large extent to increased income tax. The capital expenditure during the year amounted to £176,194, most of which was spent on large extensions of the generating station; the capital outlay on the whole undertaking now amounts to £1,669,744. The sales of electricity increased from 33,320,044, to 33,953,695 kWh and the average price obtained per kWh from 1.449d. to 1.451d.; the maximum demand reached 16,892 kW, as compared with 15,336 kW in the previous year. New consumers numbered 1,622 bringing the total at March 31st to 17,909.

Dorking.—Extensions.—Edmundson's Electricity Corporation, Ltd., is making preparations for supplying electricity by overhead lines to Brockham, Betchworth, and Buckland.

East Grinstead.—Extensions.—Approval was given at a recent meeting of the Urban District Council to a scheme for the supply by the Council of electricity within the Ashurst

Wood Ward of the parish of Forest Row. Application is to be made to the Electricity Commissioners for permission to extend its supply area.

Grimsby.—YEAR'S WORKING.—We have received from Mr. S. W. Windle, borough electrical engineer, a copy of his report, together with a statement of accounts of the electricity undertaking for the year ended March 31st last. The total revenue amounted to £102,032, as compared with £99,671 in the preceding year, and the total working costs were £58,412, as against £53,189. The gross profit declined from £46,482 to £43,620. After providing for capital and other charges there was a net surplus of £11,617, which compares with £15,752 in in 1928-29. Expenditure on capital account during the year totalled £121,420, of which £59,739 was for machinery and £31,837 for mains and services. The electricity sold for all purposes increased from 15,857,764 to 16,920,908 kWh, and the maximum load from 6.344 to 7.078 kWh. The average price obtained per kWh fell from 1.51d. to 1.45d. A new 10,000-kW turbo-generator was put into operation during the year and considerable progress was made with the installation of new steam raising and ancillary plant.

Guildford.—PROPOSED EXTENSIONS.—The Corporation Electricity Committee is considering the question of giving a supply to Albury Heath, Brook, Farley Green, Little London, and Peaslake.

Hastings.—LOAN SANCTIONED.—The Corporation Electricity Committee has obtained sanction to the borrowing of £7,190 in connection with the supply to the villages of Staplecross, Cripps Corner, and Ewhurst.

India.—ELECTRICAL DEVELOPMENT.—Marked progress in the electrical development of the Punjab was made in 1929. According to *Indian Engineering*, a licence was granted for the electrification of Kasauli, and applications were received for licences for Hoshiapur, Montgomery, Sargodha, Shahdara, Hissar, Hansi and Bhiwani. An application was also received for the electrification of Sirsa but this was subsequently withdrawn. Licensees at Lahore, Rawalpindi, Sialkot, Jhelum, Gujranwala and Jullundur applied for extensions of their respective areas of supply and an extension was actually sanctioned in the case of Jhelum. As the result of sanction given to the Model Town Society, Ltd., of Lahore, to engage in the business of supplying electrical energy, the Model Town was electrified during the year.

In Mysore the special schemes under consideration include one for generating electricity at Jog falls. In the first instance the scheme is expected to provide electrical energy to the extent of 10,000 h.p. at the Bhadravati Iron Works, Davengere and Harihar, being increased ultimately to 40,000 h.p.

Kirriemuir.—ELECTRICITY SCHEME.—The Town Council has decided to ask the Grampian Electricity Supply Co., Ltd., to submit plans of a complete lighting system for the town.

London.—BERMONDSEY.—Subject to a satisfactory agreement being reached, the Borough Council Electricity Committee is to give an additional 6,000-V supply to a consumer at a total estimated cost of £3,400.

Motherwell.—YEAR'S WORKING.—In his annual report Mr. Brassington, the burgh electrical engineer, states that there are quite a number of all-electric houses in the burgh, and that four public halls have installed tubular heating with satisfactory results, both in regard to running cost and efficiency. The domestic cooker load is progressing very favourably, the increase in cooker installations over the previous year being 40 per cent. Financially, there is a balance on the years working of £15,486.

Northern Ireland.—LONDONDERRY.—The Corporation has adopted a scheme for using its spare generating station for supplying electricity for domestic and heating purposes, the estimated profit being £4,000 a year. The scheme includes the conversion of the Strand Road offices into electrical showrooms at a cost of £1,000.

PORTSTEWART.—The Urban District Council has received sanction to the borrowing of £2,158 to cover the recent extension of the electricity plant and excess expenditure of a capital nature during the past few years.

Oswestry.—SPECIAL ORDER.—At a special meeting of the Town Council it was decided to apply to the Electricity Commisioners for a Special Order to extend the Corporation's area of electricity supply so as to include the rural parishes of Kinnerley, Knockin, Llanyblodwel, Llanymynech, Ruyton of the Eleven Towns, West Felton, and parts of the parishes of Selattyn, Whittington, and Oswestry rural.

Paisley.—LOAN SANCTIONED.—Sanction has been received by the Electricity Committee to the borrowing of £17,647 in connection with the electricity undertaking.

Penang.—GEORGE TOWN.—The report of the Electricity Supply Department for the year ended December 31st last has been received from the municipal electrical engineer, Mr. T. Rogers. The total revenue from the undertaking showed an increase from £155,782 to £166,750, while the total working expenditure amounted to £88,522, as compared with £86,013. There was a gross profit of £78,228, as compared with £69,769, and, after providing for interest on loans and sinking fund contributions, there was a net surplus of £32,479 (£27,952). Capital expenditure during the year amounted to £38,896, bringing the total now spent on the undertaking to £1,013,289. The electrical energy sold increased from 10,879,514 to 13,036,121 kWh and the maximum load from 3,950 to 4,300 kW. It is expected that an extension to the Prai power station and a new submarine cable will be put into commission either this month or next, and it will then be possible to shut down completely the old station at Sungei Penang. E.h.p. cables have been ordered to connect Presgrave Street to Pitt Lane sub-station, and this will complete the double ring of e.h.p. cables connecting all main sub-stations together. Progress in the supply on the mainland was maintained, the electricity sold showing an increase from 554,641 to 1,336,885 kWh.

Plymouth.—LOAN SANCTIONED.—The Corporation Electricity Committee has obtained sanction to a loan of £100,000 for mains and services.

Portsmouth.—NEW SWITCHGEAR.—The Corporation Electricity Committee has obtained sanction to the borrowing of £48,245 for the installation of new switchgear and the building of a switch house at the generating station.

Preston.—YEAR'S WORKING.—In the annual report of the Corporation electricity undertaking for the year ended March 31st last, it is recorded that the gross profit amounted to £126,292, an increase of £2,180 over the previous year; there was a net surplus of £7,327. This satisfactory result is in spite of increased expenses on the undertaking amounting to £22,001, which is more than offset by an increase in the income of £24,181.

FIRE AT POWER STATION.—An explosion occurred at the new Ribble electricity power station on September 11th and as a result the electricity supply to Blackpool was cut off for nearly an hour; other districts were not seriously affected. Mr. J. F. Simpson, the borough electrical engineer, said until the transformer was opened it would be impossible to discover the actual cause. Blackpool's supply system is not yet complete and certain rearrangements are being made at the Blackpool sub-station which will greatly improve the service.

Sheffield.—EXTENSIONS SANCTIONED.—The Town Council has received sanction to give a supply of electricity to Dronfield and Beighton.

Stalybridge. — UNEMPLOYMENT GRANT. — The Stalybridge Hyde, Mossley, and Dukinfield Tramways and Electricity Board has received from the Unemployment Grants Committee a grant of 50 per cent. of the interest on approved expenditure out of loan not exceeding £143,105 for cable laying, &c.

Stockport.—LOAN FOR CHANGE-OVER SANCTIONED.—The Town Council has received sanction to a loan of £10,000 for the changing over of consumers' apparatus.

Stockton.—EXTENSIONS.—The Corporation is applying for sanction to a loan of £10,000 for mains and services in connection with new building estates. During last year 948 new services were installed in private residences; the assisted wiring scheme also proved successful.

Stoke-on-Trent.—EXTENSIONS.—The Corporation Electricity Committee has decided to make arrangements for a supply of electricity to Blurton at a cost of £3,000. Mains are also to be extended to supply houses to be erected in Uttoxeter Road, Normacot, at a cost of £400; and to improve the supply in the Pittshill and Victoria Road area, Tunstall, at a cost of £800.

LOANS.—The Electricity Committee has obtained sanction to the borrowing of £5,630 for buildings, mains and plant in connection with an additional supply of electricity in Longton and Burslem, and £7,200 for sub-station buildings, plant and mains (Stoke and Hanley). Application is also to be made for sanction to the borrowing of £6,000, the estimated cost of sub-station buildings, equipment, the looping-in of e.h.p. cable and the necessary l.p. feeders in connection with the proposed a.c. supply in the Dresden area.

Swansea.—NEW STATION.—The Town Council has decided to proceed immediately with the erection of the new power station at Crymlyn Burrows. The first section, it is stated, will have a capacity of 60,000 kW; this, however, will be increased ultimately to 240,000 kW. At present it is proposed to spend £1,400,000, the ultimate expenditure being in the neighbourhood of £3,250,000.

Swindon.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer and manager: Mr. A. Nicklin) for the year ended March 31st last, show a total revenue of £101,267, a working expenditure of £57,187, and a gross profit of £44,080. The corresponding figures for the preceding year were: Income, £84,334; working expenses, £40,265; gross profit, £44,069. After providing for interest on loans, sinking fund contributions and income tax, there was a net surplus of £5,115, as compared with £19,071 in 1928-29. The capital expenditure during the year amounted to £84,623, and included £39,396 for machinery and £22,714 for mains and services. The total capital expenditure on the undertaking now stands at £609,696. The electrical energy sold increased from 10,243,006 to 15,745,898 kWh, and the maximum supply demanded from 4,740 to 7,140 kW.

LOANS SANCTIONED.—The Town Council has received sanction to loans of £20,500 for the alteration of the system of supply, and £50,750 for additional generating plant at the Moredon generating station.

Turton.—LOAN SANCTIONED.—Sanction has been granted to the borrowing by the Urban District Council of £13,960 for electricity extensions, consisting of new mains in Belmont and h.p. mains to feed the existing area.

United States.—HYDRO-ELECTRIC SCHEME.—The California-Oregon Power Company has filed an application with the Federal Power Commission for a licence to proceed with its proposed development on the North Umpqua and Clearwater Rivers in Douglass County, Ore. *Power* says that this development consists of four projects—Rock Creek, Boundary, Toketee, and Lemolo, on the North Umpqua, and one unit on the Clearwater River. There will be two power houses at the Lemolo site and at the Clearwater site. The primary power that will thus be made available is estimated at 117,915 h.p.; it is planned, however, to install 250,300 h.p.

Walton-on-Thames. — EXTENSIONS. — The Urban District Council has decided to extend its supply of electricity to Burwood Park at an estimated cost of £11,800. Similar extensions in respect of other estates are under consideration.

West Hartlepool.—FREE WIRING SCHEME.—The borough electrical engineer has been authorised by the Town Council to carry out a further 500 free wiring installations over a period of nine months.

Tramway and Railway Notes.

Australia.—MELBOURNE.—The Transport Bill just presented in the Victoria Legislative Assembly provides, *inter alia*, for the abolition of the Tramways Board. The tramways undertakings will be placed under the control of a Commissioner of Tramways, to be appointed for five years. The Commissioner will not have power to purchase material from outside Victoria without the permission of the Minister of Transport.

Canada.—THE MONTREAL RAILWAY TERMINUS.—The Montreal City Council has ratified the plans of the Canadian National Railways, allowing the company to proceed immediately with the construction of its tunnel and terminus, and of elevated tracks from the terminus to Victoria Bridge. Other features of the scheme have been left open for future discussion between the City and the railway company. The railway terminus scheme will involve an expenditure of approximately 50,000,000 dollars.—*Reuter* (Montreal).

Hastings.—RAILLESS CARS.—The Corporation Highways Committee reports that it has received notification from the Hastings Tramways Co. that its Bill for the running of railless cars has received Royal Assent, and that the company wishes to carry out as promptly as possible the extension of its system in Cambridge Gardens, and Havelock Road.

Hove.—THE PROPOSED TRAFFIC MERGER.—The Town Council has approved a recommendation of the General Purposes Committee for the sealing of a draft agreement with the Brighton Corporation and Messrs. Thomas Tilling, Ltd., for the establishment of a Traffic Board to control the transport of the district. It is proposed that the Board shall consist of five members, two representing Brighton Corporation, one the Hove Corporation, and two the company. The Brighton Corporation will hand over its trams to the Board, when it is constituted, and the company will hand over its 'buses, while Hove will contribute £100,000.

Kirkcaldy.—TRAMWAY ABANDONMENT.—The Town Council has decided to abandon the tramway system in Kirkcaldy and has asked the Transport and Electricity Committee to recommend the best method of replacing it.

London.—THE PICCADILLY TUBE EXTENSION.—It is expected that work on the extension of the Piccadilly tube railway from Finsbury Park to Southgate and Cockfosters will be commenced this month. The construction of the tunnel, which is being carried out by Messrs. Charles Brand & Son, is to be completed within twenty months from the time of starting.

Manchester.—THE ALTRINCHAM TRANSPORT QUESTION.—The Transport Committee of the Manchester Corporation has received from the Altrincham Urban District Council and other bodies in Altrincham a request that the trams serving that town shall be replaced by omnibuses. *Modern Transport* states that the Committee has not yet come to a decision, but that there is a good prospect of the change being made in the near future.

Penang.—GEORGE TOWN.—We have received from Mr. T. Rogers, municipal electrical engineer and tramways manager, a copy of his annual report on the working of the tramway undertaking for the year ended December 31st last. The total revenue amounted to £37,706, as compared with £33,006 in the preceding year, the working expenditure increasing from £24,690 to £28,301; the gross profit was £9,405, as against £8,316. After providing for capital and other charges there was a net surplus of £1,335 as compared with £1,321 in 1928. The capital expenditure during the year amounted to £10,738, of which £9,555 was for railless cars. The total number of passengers carried during the year by the trams, 'buses, and railless cars increased from 8,951,462 to 10,586,146. The new railless-car extension to Jelutong was completed and a considerable number of passengers previously lost on this section of route have been regained.

Reading.—TRAMWAY ABANDONMENT.—The Ministry of Transport has granted the Corporation's application to abandon the tramway service operating in Bath Road, Castle Hill, Castle Street and St. Mary's Butts.

Telegraph and Telephone Notes.

Argentina. — TELEPHONY EXTENSION. — The *Review of the River Plate* states that the Compañia Argentina de Telefonos has inaugurated a new telephone service between Rufino and Rosario which places in communication with each other the Pampa Territory and the Provinces of Cordoba, Santa Fe, and Buenos Aires. The Union Telefonica also announces that a telephone service between Argentina and Brazil will be established early in the new year.

Australia.—RADIO-TELEPHONY.—A wireless telephone service between Australia and New Zealand is to be opened shortly.

Dundee.—AUTOMATIC BRANCH EXCHANGES.—A scheme for the establishment of branch automatic telephone exchanges at various points in the city, to relieve the pressure on the main exchange, has been embarked upon by the G.P.O. Plans have been passed for a new subsidiary exchange.

Europe.—TELEPHONE PROGRESS.—According to the *Telegraph and Telephone Journal*, the statistics for 1929 which have so far come to hand indicate that the total number of telephones in Europe amounted to nearly ten millions. This total, perhaps, does not compare very favourably with the North American total of over 20 millions, but it may be noted that, whilst America is increasing at the rate of about 4¼ per cent. per annum, the increase for Europe is at the rate of 8 per cent. It is gratifying to note that Europe's total has doubled in ten years, whilst that of North America has increased by almost exactly one half (14 to 21 millions) in the same period. The principal contributors to Europe's record increase are Germany with over 230,000 stations, Great Britain with 127,000, France with 90,000, Italy with about 50,000, Russia and Spain each with about 36,000, Holland with nearly 27,000, and Sweden and Switzerland with over 24 and 22 thousands, respectively.

Glasgow.—POLICE TELEPHONES.—Demonstrations of a "Carter-Micro" police telephone were given recently at Glasgow Central Police Station, and it is stated that the chief constable is to recommend its adoption. The cost of one unit consisting of 40 call boxes is £2,000, and to equip the various divisions of the city with the new system would involve an expenditure of £15,000. The apparatus is in use at Rochdale.

Iceland.—TELEPHONY.—The past year saw the completion of a telephone line encircling the whole of Iceland. Many difficulties were experienced owing to the fact that the supporting masts have in some places had to be erected where avalanches frequently occur. Another cause of trouble is the formation of ice on the telephone wires. Nearly every village or little parish on the island can, however, now be reached by telephone. The length of the wires in operation in Iceland has increased from about 800 miles in 1906 to 6,675 miles at the beginning of the present year.

India.—PROPOSED BEAM WIRELESS SERVICE WITH JAPAN.—As the result of three-cornered negotiation between the Indian Radio Telegraph Company, Mr. Kuchida, head of the Japan Wireless Service, who is at present in India, and the Indian Government, it is probable that a beam wireless service will be established next year between India and Japan. It is understood that certain preliminaries have already been settled and it is expected that further progress will be made with the return of Sir Ness Wadia, who will be in Bombay shortly. It is expected that one of the results of the new system will be a considerable reduction in charges.—*Reuter* (Bombay).

Italy.—A TRANSPORTABLE TELEPHONE CALL BOX.—A transportable telephone call box has recently been brought into use at the railway station at Naples for the convenience of passengers.

Portuguese East Africa.—NEW RADIO-TELEGRAPH SERVICE.—A radio-telegraph service between Portuguese East Africa and the Portuguese colony of St. Thomé and Principe is to be inaugurated shortly.

Ship-shore Telephony.—CORRECTION.—With reference to the paragraph appearing under this heading on p. 424 of our last issue we learn that the apparatus on the Southern Railway's steamer *Canterbury* was supplied and installed by the International Marine Radio Co., Ltd., and not by the Marconi Company, as stated.

Sweden.—TELEPHONE COMMUNICATION WITH SHIPS.—A fresh extension of its facilities has just been obtained for the Swedish telephone system by the arrangement of communication, through the British telephone system, with the liners *Majestic*, *Olympic*, *Homeric* and *Leviathan*, on their voyages between New York and Southampton.—*Reuter's Trade Service* (Stockholm).

Telephony.—A STUDY OF AMERICAN METHODS.—A number of engineers from the British Post Office have visited the United States for the purpose of studying telephone methods, and especially the handling of toll traffic. The party, which included representatives of the headquarters traffic staff, the London telephone service and the office of the engineer-in-chief, visited, in the course of a five weeks' tour, long-distance and other offices in New York, Washington, Chicago, Buffalo, Detroit, Boston, Springfield, and Worcester.

United States.—NEW CABLE.—Approval has been given to the American Telephone and Telegraph Co.'s application to lay a cable between Key West (Florida) and Havana (Cuba).

Radio Notes.

Australia.—MORE RELAY STATIONS.—Following the policy of erecting relay stations throughout Australia in centres where reception is unsatisfactory, the Government will shortly call for tenders for more new stations. The Postmaster-General expresses the hope that local firms will get future contracts, although hitherto the Government has been compelled to accept outside tenders.

Colombia.—BROADCASTING INSTALLATION CONTRACT.—A contract has been awarded to a German firm for the installation of broadcasting facilities at the Colombian radio stations. A commencement will be made with the Bogotá station, the work involving the provision of entirely new equipment, rendering it possible to broadcast simultaneously on long and short waves.—*Reuter's Trade Service* (Bogotá).

Hungary.—NEW STATION.—According to the *Wireless World*, plans are maturing for the construction at Budapest of a powerful new broadcasting station, modelled on the lines of the British regional stations. Two programmes will be transmitted simultaneously.

Italy.—WIRELESS ON TRAINS.—It is announced that railway passengers in Italy will shortly be able to hire earphones from the guards and listen to the broadcast programmes. Special apparatus will be carried on the trains and a start will be made on slow trains between Milan and Turin.—*Reuter* (Rome).

Russia.—BROADCASTING DEVELOPMENTS.—According to *World-Radio*, information received from Moscow indicates that an intensive development of the Russian broadcasting system is now proceeding rapidly, and that several new stations are approaching completion. It is announced that tests have begun with a new transmitter situated at Kolpino, 16 miles south-east of Leningrad; the power of this station is given as 75 kW. It is further stated that the five-year plan of "radification" provides for the erection of a number of high-power and "super-power" transmitters to serve Central Russia. They will be situated at Bogorodsk, 35 miles east of Moscow, and the first, which will have a power of 100 kW, is now nearly ready. The high-power Moscow station has recently taken the place previously occupied by Kharkov on 1,304 metres, while Kharkov has moved to a lower wavelength.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Ashbourne.—September 20th. Urban District Council. Transformer kiosk and equipment; also e.h.p. and l.p. cables and roadwork. (August 22nd.)

Australia.—MELBOURNE.—Posts and Telegraphs Department. September 30th. Switchboard, instruments, and test plugs and sleeves. (A.X. 9937.)*
Transmitters and associated parts. (A.X. 10077.)*
October 14th. Condensers. (A.X. 10000.)*
November 18th. Telephone receivers, ebonite earpieces, &c. (A.X. 10183.)*
November 25th. Motor generator sets. (A.X. 10184.)*
SYDNEY.—September 29th. Municipal Council. 33,000-V cable. (A.X. 10078.)*

Belfast.—October 15th. Harbour Commissioners. Three electrically-driven pumps at Clarendon Graving Docks. Specifications, &c., from Mr. W. Y. Chamberlain, acting chief engineer, Harbour Office, Belfast. Tenders to Mr. M. J. Watkins, general manager and secretary, Harbour Office, Belfast.
September 23rd. Board of Guardians. Installation of electric lighting and wiring for motors at central laundry; also electrical work in connection with the change-over from d.c. to a.c. Specifications from Mr. R. H. Wilson, clerk of the Belfast Union.

Belgium.—BRUSSELS.—The Société Nationale des Chemins de Fer Belges announces that it will shortly be inviting tenders from a limited number of makers for the supply and laying of a quantity of underground armoured cables in the Antwerp district. Firms desirous of being invited to take part in the tendering should communicate with the Service du Materiel, Division des Achats, Bureau 26-5, 21 Rue de Louvain, Brussels.

Birmingham.—September 22nd. Salvage Department. Steam-driven generators and balancer set. Specifications from the general manager, 161, Corporation Street (deposit £1 1s.).

Bolton.—September 22nd. Public Assistance Committee. Electric lamps required during six months ending March 31st, 1931. Form of tender from Mr. S. Kinlay, Public Assistance Officer, 28, Mawdsley Street.

Egypt.—ZAGAZIG.—October 15th. Municipal Council. Four 25-kVA single-phase transformers. (A.X. 10153.)*

Ely (Cambs.).—October 1st. Rural District Council. Generator, battery, switchboard, &c. (September 12th.)

Exminster (Exeter).—September 26th. Mental Hospital. Supply of electric lamps for six months. Particulars from Mr. C. Masters, clerk.

Great Western Railway.—October 3rd. Telegraph instruments and electrical apparatus, including wires, cables and insulators. (See this issue.)

Grimsby.—October 3rd. Electricity Department. L.p. cables. (September 12th.)

Inverness.—September 25th. Electric lighting of housing scheme. Schedules from Mr. J. G. Chisholm, architect, 15, Union Street. Tenders to town clerk.

London. — CENTRAL ELECTRICITY BOARD. — October 6th. 66,000-V and 33,000-V overhead transmission lines for the North-East England Electricity Scheme. (August 29th.)
October 20th. Metering equipment for certain stations in connection with the Mid-East England Electricity Scheme. (September 5th.)
October 13th. 132,000-V transformers for the North-East England Electricity Scheme. (September 12th.)
OFFICE OF WORKS.—September 23rd. Electric lift at Somerset House, W.C.2. (September 5th.)
September 30th. Electric passenger lift at the Royal Hospital, Chelsea. (September 12th.)
October 7th. Electric lift at the National Physical Laboratory, Teddington. (See this issue.)
October 10th. Electric wiring at Leonard Street Post Office, Shoreditch. (See this issue.)
September 23rd. India Stores Department. Telephone insulators and pins and copper-clad steel wire. (September 12th.)
COUNTY OF LONDON ELECTRIC SUPPLY CO., LTD.—October 24th. Turbo-alternators, circulating water screening plant, condensing plant and auxiliary apparatus, and overhead electric travelling cranes, in connection with Barking power station extensions. (See this issue.)

Marlborough.—September 25th. Electricity Department. Extension of 11-kV, 3-phase overhead lines to Savernake Hospital. (August 22nd.)

Newcastle-upon-Tyne. — October 10th. Newcastle-upon-Tyne Electric Supply Co., Ltd. Steel frame buildings for power station; also 120-ton and 25-ton overhead electric travelling cranes. (August 29th.)

New Zealand.—WELLINGTON.—Post and Telegraph Department. November 5th. Telephone transformers. (A.X. 10170.)*

Rosslynlee.—September 27th. Midlothian and Peebles District Asylum. Supply of stores, including electrical fittings, &c. Forms of tender from Chilton L. Addison-Smith, W.S., clerk and treasurer, 19, Heriot Row, Edinburgh.

Smethwick.—Education Committee. Heating by electricity of new secondary school for boys shortly to be erected. Particulars from S. Childs, director of education, Education Offices, 215, High Street.

South Africa.—CAPE TOWN.—October 1st. City Electricity Department. Four-pin plugs and sockets. (A.X. 10166.)* Metal-clad combined switch- and fuseboards. (A.X. 10167.)* October 16th. Electric cables. (A.X. 10162.)*

Staffordshire.—September 27th. Education Committee. Installation of electric lighting at new Rookery Lane senior mixed school, Pensnett, near Dudley. (August 29th.)

Uruguay.—MONTEVIDEO.—October 31st. Public Cleansing Department. 1,000-kW turbo-generator, switchgear, transformers and waste fuel boilers. (A.X. 10180.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.

Contracts Closed.

Australia.—SYDNEY.—Municipal Council. Accepted :—
H.p. and l.p. switchgear for Clarence Street sub-station, and setting to work 11,000-V switchgear and control board (£7,488).—Metropolitan-Vickers Electrical Co., Ltd.

VICTORIA.—State Electricity Commission. Accepted :—
Three-core and single-core cable (£3,621).—British Insulated Cables, Ltd.
—*Tenders.*

Dorchester.—Lighting Committee. Recommended :—
Cable in South Street (£58).—Johnson & Phillips, Ltd.
Boxes, jointing, excavations and reinstatements in South Street (£70).—District Transmission Lines, Ltd.

Kinghorne (Fife).—Town Council. Accepted :—
Electric lighting of 40 houses (£211).—D. Murray.

Kirkintilloch.—Corporation. Accepted :—
Electrical installation at Corporation housing scheme.—Grindlay, Ross & Co., Ltd.

Lamp Contracts.—The G.P.O. has placed contracts with Edison Swan Electric Co., Ltd., for electric lamps, and with Siemens Electric Lamps & Supplies, Ltd., for the supply of gasfilled, vacuum and special lamps for twelve months.

London.—SHOREDITCH.—Electricity Committee. Recommended :—
Switchgear for the proposed e.h.p. bulk supply to the L. & N.E. Railway Co. (£2,394).—General Electric Co., Ltd.

Portland.—Finance Committee. Accepted :—
Wiring and fittings for council offices.—Parsons Beck.

Smethwick.—Gas Committee. Accepted :—
Automatic telephone system (£209).—Automatic Telephone Manufacturing Co., Ltd.

Forthcoming Events.

Women's Engineering Society.—Oxford. September 19th to 21st. Eighth annual conference.

Association of Special Libraries and Information Bureaux.—Oxford. September 19th to 22nd. Seventh annual conference.

National Radio Exhibition.—London, Olympia. September 19th to 27th.

Association of Mining Electrical Engineers (South Wales Branch).—September 20th. Visit to the works of Steatite and Porcelain Products, Ltd., Stourport, and the power station of the Shropshire, Worcestershire and Staffordshire Electric Power Co.

Institute of Marine Engineers.—September 23rd. The Institute, 85, The Minories, E.C.3. Presidential address by Lt.-Com'r Sir August B. T. Cayzer, Bart.

Municipal Tramways and Transport Association (Inc.).—Harrogate. September 24th to 26th. Annual conference.

Institute of Fuel.—September 25th. Visit to Barking power station, Greenwich fuel research station, and Deptford generating stations.

Electrical Power Engineers' Association (Southern Division).—September 27th. Holborn Restaurant, High Holborn. London, W.C.1. 5.30 for 6 p.m. Annual dinner.

Motor Show.—London, Olympia. October 16th-25th.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of makers of the following devices:—

COGENT electric heaters.
VACLITE bunker fittings.
ECO-DRY clothes-drying cabinet.
ATRAX lighting units.
BETEL powder for mouldings.

Notes.

The B.E.A.M.A. Dinner.

The dinner of the British Electrical and Allied Manufacturers' Association will be held at the Connaught Rooms, Great Queen Street, London, on Wednesday, November 19th, at 7 for 7.30 o'clock.

Television for Kinemas.

The *Daily Telegraph* reports that one of the large circuits of kinema theatres has been negotiating with the Baird Television Co. for an immediate installation in all its houses of the necessary apparatus for showing wireless news pictures. This, it is claimed, will be the first example, either in this or any other country, of "televised" pictures forming a nightly item in kinemas.

Mines Department Announcement.

At the invitation of the Secretary for Mines, the Executive Committee of the Miners' Federation recently visited the Mines Department to discuss various matters pertaining to the industry. The executive committee took the opportunity to put before the Minister resolutions passed at the Weston-super-Mare Conference on various matters, including the need for the compulsory adoption of gas-detecting appliances. The Minister invited the Miners' Federation to appoint two sub-committees of the executive committee to explore further certain of the matters which had been under discussion.

Electrical Accident Committee.

With the object of discovering means of reducing the number of electrical accidents in France, the French Ministry of Public Works has lately appointed a Comitè Central de Prevention des Accidents Electriques.

A Clyde Radio-telephone Beacon.

The minutes of the Management and Finance Committee of the Clyde Lighthouses Trustees makes reference to the radio-telephone beacon at Cumbrae lighthouse. The Postmaster-General had stated that, in the event of the trial proving successful, he would be prepared to grant formal authority for the establishment of a permanent radio-telephone beacon at Cumbrae lighthouse; the cost of the permanent installation would be between £500 and £600. The apparatus consists of a radio-gramophone working in conjunction with a foghorn. A signal from a gramophone record is transmitted by wireless while at the same time a blast is given on the lighthouse foghorn. The radio operator on board a ship in that vicinity knows how far sound travels in a given time, and by checking the interval between the receipt of the wireless signal and the hearing of the foghorn he knows exactly the ship's distance from the lighthouse.

A Belgian Electrical Museum.

Largely as the result of the efforts of a committee headed by M. Ch. Mourlon, one of the oldest electrical engineers in Belgium, a Musèe National de l'Electricitè has recently been opened in one of the large halls of the Palais du Cinquantenaire, Brussels. The Belgian Post and Telegraph Authorities, as well as the principal Belgian electrical engineering concerns, have contributed exhibits to the museum, which, among others, include copies of the designs of the first Gramme dynamo, a drawing of the first Jaspar arc lamp—a type used in the French Army as long ago as 1854—a model of the early "Pieper" arc lamp, and the first dynamo constructed by Dulait, whose little workshop has in the course of years developed into the huge works of the Société des Ateliers de Constructions Electriques of Charleroi.

The National "Safety-First" Association.

"On Guard" is the title of a special little pocket magazine issued by the National Safety-First Association as part of a specialised accident prevention service, which consists of an intensive campaign each month against one of the principal dangers of industry. This month the particular hazard covered is "Collisions with Objects," which, as Sir Gerald Bellhouse, Chief Inspector of Factories, points out, are the cause of injury to about 11,000 people each year in industry alone. He gives some useful hints on how to avoid such injury. The magazine deals with various aspects of health, as well as safety, at work, in the street and in the home.

Marlborough's Electricity Supply.

The electricity undertaking at Marlborough is owned and controlled jointly by the College and Corporation, and the system, d.c., 220 V, 2-wire, is unsuitable for a public supply. The supply is generated at present by means of an oil-engine power station. For the two past years the maximum load in the winter has been nearly equivalent to the maximum capacity of the plant, and for three years ways and means have been sought of increasing the capacity. It was desired to avoid the expense of extending the generating station if possible, because that would merely perpetuate the difficulty of 200-volt distribution, so that considerable risk was run in order to wait until the Wessex Electricity Company was in a position to give a bulk supply. One of the problems was how to change over to a bulk supply without impairing the financial success of the undertaking. A contract was entered into with the Wessex Company and a main transmission line has been erected by the Corporation from the company's Ramsbury line to the power station. It was decided to remove the battery and put "Hewettic" rectifiers in the battery room, maintaining the d.c. supply to the centre of the town, using the oil-engine plant to reduce the maximum demand on the bulk supply, so that it is expected that the undertaking will only pay the Wessex Company a low average price per unit, as the company will take the base load and the oil engines the peak. It is intended eventually to change over the outlying parts of the area to a.c. distribution, and for that purpose a spur line will shortly be erected from the main transmission line to the Savernake Hospital, where a large demand for electricity has arisen during the past two years; this point being the farthest from the generating station has caused considerable trouble in maintenance of proper pressure. The bulk supply was inaugurated on September 15th.

The contractors for the overhead line were Messrs. Johnson and Phillips, Ltd., and it is interesting to note that the conductors are steel-cored aluminium of the sectional design manufactured by Messrs. British Ropes, Ltd. The other contractors were Messrs. Hewettic Rectifiers, Ltd., who have supplied and fixed the whole of the converting plant, including transformers and switchgear. The consulting engineers for the scheme were Mr. H. M. Leaf for the College, and Messrs. A. Hugh Seabrook & Partners for the Corporation.

Welding-Articles Competition.

Commencing with the November issue the proprietors of *The Welder*, Alloy Welding Processes, Ltd., have decided to offer a monthly prize of £5 5s. for the best illustrated article describing interesting jobs undertaken by the electric arc welding process. The competition is open to all readers of *The Welder*, and it should be emphasised that the object of this competition is not so much to obtain literary essays on welding as to obtain details relating to interesting welding practices.

Development in Canada.

According to a mid-year review issued by the Canadian Department of the Interior, covering the period up to June 30th, 1930, hydro-electric construction is at present being carried on in Canada more actively than at any previous period in the history of the Dominion; installations aggregating more than 1,680,000 h.p. are under development. Many of them comprise initial stages only, and when the installations have reached their ultimate designed capacities a further 2,000,000 h.p. will be added to Canada's hydro-electric works.

In the Pacific Coast Province the British Columbia Power Corporation, through subsidiary companies, accounts for two of the major developments. They are on the Stave and Bridge Rivers, the former ultimately to have an installation of 188,000 h.p., with a first unit of 47,000 h.p. to be in operation this year. The Bridge River project will have an ultimate installation of 600,000 h.p., with 80,000 h.p. in operation in 1932.

In Manitoba two large hydro-electric undertakings are under construction on the Winnipeg River. The North Western Power Company is developing the Seven Sisters site to have an ultimate installation of 225,000 h.p., with three units; half the power is expected to become available in 1931.

There are also two outstanding developments under construction in Ontario, although one on the Ottawa River, an interprovincial stream, is shared with the Province of Quebec. The largest is on the Abitibi River where construction has started on a 275,000-h.p. development by the Hudson Bay Power Company. The second is at Chats Fall on the Ottawa River, where the Ontario Hydro-Electric Power Commission is jointly carrying out a 224,000-h.p. undertaking with the Chats Fall Power Company, the latter having a license to develop on the Quebec side of the river. The plant will probably be ready for operation late in 1931.

In Quebec the Beauharnois Light, Heat and Power Co. is energetically pressing construction on the St. Lawrence River with the building of a power and ship canal fifteen miles in length between Lake St. Francis and Lake St. Louis and a 500,000-h.p. station located at Lake St. Louis. The initial units of 200,000 h.p. are to be in operation by October, 1931. The Shawinigan Water & Power Company has commenced construction of the first of six installation on the Upper St. Maurice River, this undertaking at Rapide Blanc to have an initial capacity of 160,000 h.p.

Another very big plant in Quebec is that at Chute à Caron on the Saguenay River, where the Alcoa Power Company is making good progress with the construction of a hydro-electric undertaking, the first stage of which will develop 260,000 h.p. in four units expected to operate early in 1931. Still another large undertaking is that of the James McLaren Company at High Falls on the Lievre River, where the construction of a 90,000-h.p. installation is practically completed, and the ultimate capacity is to be 120,000 h.p.

The Illuminating Engineering Society.

The opening meeting of the Illuminating Engineering Society will be held at the E.L.M.A. Lighting Service Bureau (15, Savoy Street, Strand, London, W.C.2), at 6.30 p.m. on Wednesday, October 8th, 1930, when the chair will be taken by the president (Lt.-Col. Kenelm Edgcumbe, T.D., M.Inst.C.E., M.I.E.E.). A report on progress in illuminating engineering will be presented, and will be followed by a display of exhibits illustrating recent developments in illumination. The hon. secretary (Mr. J. S. Dow, 32, Victoria Street, London, S.W.1) will be pleased to hear from any members desiring to exhibit equipment or apparatus.

Appointments Vacant.

Electrician for the Shropshire, Worcestershire and Staffordshire Electric Power Company.

Technical assistant in the Electrical and Rolling Stock Department for the Manchester Corporation Transport Committee.

Distribution engineer for the Kettering Urban District Council.

Plumber-jointer and cable-jointer for Lowestoft Electricity Supply and Tramways Department.

Plumber-jointer for Beckenham U.D.C. Electricity Department.

(See our advertisement pages to-day.)

Dunoon Electricity Supply.

The Dunoon electricity undertaking, operated by the Dunoon and District Electricity Supply Co., was inaugurated on September 15th. Mrs. Turner, wife of the Provost of the town, switched on the power at the new station, and in the evening Mrs. McFarlane, wife of Councillor Angus McFarlane, convener of the Street Lighting Committee, switched on the street and festoon lighting. Over 2,000 multi-coloured lamps flashed along the sea front for a distance of half-a-mile, and the scene was one of great brilliance. A luncheon was given by the company at which Sir Philip Dawson, M.P., presided, and referred to the successful way in which the undertaking had been carried to completion. The promoters are well pleased with the support accorded to the scheme by the people of the town, and the various functions were attended by large gatherings from a wide district of Argyllshire.

Interesting presentations were made in the course of the proceedings, Mrs. Turner and Mrs. McFarlane receiving small electric lamp standards supplied by Messrs. Johnson and Phillips, Ltd., by whom the supply company was formed and capitalised.

The Bakers' Exhibition.

The thirty-fourth International Exhibition and Market of the Confectioners, Bakers, and Allied Trades was held from September 6th to 12th. From the electrical point of view, the most interesting exhibits were those of bread-baking ovens. The use of electric motors, chiefly of the built-in type, is now recognised practice for other machinery required by bakers, and the exhibits of this type followed closely those of previous years.

The General Electric Co., Ltd., showed a "Magnet" double-deck electric oven with a capacity of a half-sack per deck; the upper deck was the peel type, and the lower a draw plate. Two 4 ft. by 4 ft. peel ovens, a 5 ft. 6 in. by 2 ft. 6 in. scone plate, and dough-nut fryers were also included in the exhibit. Baking demonstrations were given and the bread thus made was utilised by the exhibition caterers. Mention must also be made of the Maas "Humidor" steam injector employed to provide moisture during the baking process—a very important adjunct in a bakery. This "Humidor" acted as a booster to a standard "Magnet" 20-gal. heating tank installed on the stand.

The Artofex Engineering Works, Ltd., made a comprehensive display with electric draw-plate ovens, dough mixing and kneading machines, cake machines, and other bakery requisites. "Vioroid" dough irradiation by means of ultra-violet rays was also a feature of this stand.

Thos. Collins & Co., Ltd., exhibited, in addition to their normal range of ovens fired by coke, oil, and gas, a new design of electric oven. This firm was also among the many displaying electrically-driven cake and dough-mixing machines.

Among other exhibitors of electrical equipment may be mentioned: Messrs. Baker Perkins, Ltd., and David Thomson, Ltd. (moulding, mixing, and dividing machinery); C. O. Ericsson Engineering Works, Ltd. (dough mixers); Frigidaire, Ltd. (refrigerators); Harben & Co., Ltd. (electrical cake decorations); Hobart Manufacturing Co., Ltd. (general utility machines, &c.); John Hunt (Bolton), Ltd. (slicing and cake mixers); Kneeda Manufacturing Co., Ltd. (kneaders and mixers); E. F. McCourt (dough mixers); Peerless Electrical Manufacturing Co., Ltd. (dish-washer, sausage-machines, and coffee grinders); Sodazone, Ltd. (iceless cabinets and dough kneaders); Southall & Smith, Ltd. (weighing and wrapping machines); and the United Yeast Co., Ltd. (cake and dough mixers).

Radio Transformers.

In the article entitled "A New Radio-apparatus Factory" which appeared in our issue of August 29th, reference was made to the publication of National Physical Laboratory test curves of the performance of radio transformers. We are informed that Pye Radio, Ltd. (known in 1924 as W. G. Pye and Co. of Cambridge), issued a N.P.L. certified frequency amplification curve on January 8th, 1924. Pye Radio, Ltd., expresses the belief that this was the first of such N.P.L. curves published.

The Electrical Association for Women.

Under the auspices of the Glasgow Branch of the above Association, a very interesting and enjoyable exhibition and fête were held on September 13th. Through the generous and wholehearted interest of the Rt. Hon. the Lord and Lady Belhaven and Stenton, the historical Wishaw House and grounds were lent for the occasion, and Lady Belhaven and Stenton (President of the Glasgow Branch) presided at the opening ceremony. She explained the object of the fête, *i.e.*, to raise funds for the forthcoming Conference in Glasgow, and to further the interest and increase the membership of the Glasgow Branch. She then introduced Lady Weir of Eastwood, who formally opened the exhibition. Provost Anderson (of Motherwell and Wishaw) explained that the lamp shades and lacquered and cellulose-sprayed standards on show were representative of local industry entirely.

Votes of thanks to Lord and Lady Belhaven, to those who lent apparatus, and to those who gave of time and material towards the success of the effort were proposed by Ed. Roselyn Mitchell, L.L.B.

Some of the exhibits were shown for the first time in Scotland, *e.g.*, an electric skill saw for cutting paling stobs and pit props. Other exhibits were a coal-cutting machine, a Wolesley sheep shearer, horse clipper, Dutch foster mother, "radio-visor" or electric watchman, &c. The usual domestic appliances were on view: cookers, washing machines, hot-water tanks, vacuum cleaners, kettles, irons, &c.

The Singer Co. lent a very interesting exhibit of sewing machines and work done thereby. One room was given up to the demonstrating of a "Hanovia" sunray lamp. There was a fine model of a 132,000-volt grid.

Music was provided in the house by wireless, and in the tea room by an electrically-driven gramophone. Water was boiled and scones baked for tea by electricity. There were various competitions, one of which was estimating the attendance; a prize, consisting of a floor lamp standard and shade, was given by Mr. Angus, of Wishaw.

An "Osram" balloon was put up during the week, and was seen in Edinburgh. The front of the house was floodlighted during the evening by means of projectors by the General Electric Co., Ltd. In spite of the breakdown in the weather, there was a continuous stream of visitors, and the attendance was stated to be well over 1,200.

The opening meeting of the winter session of the Bradford branch of the Association took place on September 10th, when Mr. Dracup, of the Bradford Electricity Department, lectured on electricity in domestic service.

Over 80 members of the Association journeyed to Weybridge on September 12th as the guests of Mr. and Mrs. H. H. Berry to their delightful country home, "Four Winds," St. George's Avenue, where Mr. Berry and his family had arranged attractive games for their visitors, and tea was served on the terrace overlooking the beautiful gardens. During the afternoon a swimming and diving display and competition were arranged. There were many features in the labour-saving house which appealed to the members, including the all-electric kitchen, with cooker, refrigerator, &c. Mr. Berry explained his well-known co-electricity system which he has installed in the house. Another feature of great attraction was the fact that the electric fires in the bedrooms could be switched off from the bed, and they could be switched on when entering the room. There were, of course, many examples of "Magicoal" fires.

Fatalities.

Whilst completing an electrical installation in a house at Beckenham, Mr. W. Parrett, aged 40, employed by the Beckenham Urban District Council, touched a "live" cable and received an electric shock which proved fatal.

The Times reports that in making a successful attempt to save the life of her servant on September 13th a Llandudno woman, Mrs. Elizabeth Catherine Roberts (46), came into contact with a "live" wire and was killed. The servant was taking clothes from a metal line in the back yard of the house when the line touched the wires carrying electricity between the house and an outbuilding. Hearing the girl's screams, Mrs. Roberts rushed into the yard, pushed the girl away from the line, but herself touched the wire.

Electricity in Rural Areas.

At the monthly meeting of the Shropshire Executive Committee of the National Farmers' Union at Shrewsbury on September 13th, Mr. E. Porter presiding, consideration was given to the question of the development of the electricity supply for rural areas. Mr. H. Hands said that at the price he had been told it would cost him to install electricity at his farm he did not think the cost would be justified, but the chairman pointed out that it was costly for individuals; that point should be investigated by the branches, because it might then be found possible to lessen the cost of installation by several people deciding to take part in the scheme. It was stated that in some cases cable had been laid through rural areas in order to take the electricity to the urban districts, but dwellers in the rural districts, who had requested to have electricity installed, had been told that they could not have it, although the main cables were actually running through their own land. What was wanted was equality of treatment for rural and urban residents. Capt. Jebb said there was a possibility that Ellesmere and Whitchurch would be served with electricity by the new year. Electricity development in the northern part of the county, however, was only beginning, and he wished to press the point that if they wanted cheap electricity they must do everything they could to keep down the capital cost of the plant required, particularly the transmission lines. The cost of electricity in England was much too high—much higher that on the Continent— and he thought the trouble was the distribution. The system was too expensive, a great deal of the expense being caused by special conditions laid down by the local authorities, as well as many other sorts of difficulties that had to be faced. It was upto all of them to do all they could to assist those responsible for the schemes, particularly in keeping down the cost of the transmission lines. On the motion of Mr. T. C. Ward it was decided to refer the matter to the General Purposes Committee for consideration, with a view to obtaining equality of treatment for the rural and urban areas.

Educational.

THE ROYAL TECHNICAL COLLEGE, GLASGOW.—Session 1930-31. Day classes commence on September 23rd; evening classes September 22nd. Enrolment, day classes, September 23rd; evening classes, September 17th, 18th, and 19th—7 to 9 p.m.

BOROUGH POLYTECHNIC INSTITUTE, Borough Road, S.E.1.—Evening classes for 1930-31 session begin on September 22nd; enrolment September 15th, 17th, and 19th.

Special courses on synthetic resins, moulding materials and plastics, will commence shortly. Particulars may be obtained on application to the Principal.

(See our advertisement pages to-day.)

E.L.M.A. Illumination Design Course.

The illumination design course which is to be conducted this autumn will be the twenty-second of the series, and it will be conducted on consecutive Monday evenings, commencing October 13th and concluding with the seventh lecture on November 24th. For some years it has been the practice of the Lighting Service Bureau to run the autumn course in this manner, as it has been found that at this time of the year members of the electrical trade can manage to attend one evening a week much more easily than they can attend the five-day courses which are usually conducted during the spring. On this occasion an innovation is being introduced by having the discussion on each evening opened by a prominent person who is connected in some way with the subject being dealt with. In addition, the subjects are being presented in an interesting manner with the aid of much new demonstration apparatus. Each successive course has been attended by a larger and more representative audience, and it is, therefore, important that application should be made as early as possible to the Manager, the E.L.M.A. Lighting Service Bureau, 15, Savoy Street. Strand, W.C.2, in order that places may be reserved.

The lecturers are as follows: October 13th, "Lighting principles and recent progress," by Mr. W. J. Jones; October 20th, "What the shopkeeper does with light," by Mr. T. Catteh; October 27th, "How to get the best out of the modern electric lamp"; November 3rd, "Electric signs and floodlighting," by Mr. H. Lingard; November 10th, "Light in the office," by Mr. F. Marsh; November 17th, "Lighting for factories and workshops," by Mr. S. Anderson; and November 24th, "The lighting of kinemas, hotels, and public buildings," by Mr. R. W. Maitland.

Multi-core Cables.

The value of five- and six-core electricity supply cables was emphasised by Mr. James Scott, consulting electrical engineer of Royal Liver Buildings, Liverpool, in an address he gave at Liverpool last week. Mr. Scott has had a pioneering interest in the introduction of five-core cables, and at the present time he is responsible for the introduction of six-core cables, which are proving useful in encouraging the use of electricity for domestic water heating. This system of distribution in cities like Liverpool, he said, should permit the sale of energy at less than ½d. per kWh. By discarding engines and installing electrical apparatus fed from the public supply, Corporations had the opportunity of making very substantial economies in public assistance institutions.

Rural Electricity Supply.

In the electrical section of the Rural Engineering Congress just held in connection with the International Exhibition at Liége a number of interesting papers were read on the subject of electricity supply in country districts. Among them was one by Mr. E. Uytborck, the general director of the Union des Exploitations Electriques en Belgique, on "The Extension of Electricity Supply to Villages and Isolated Farms." one by Mr. J. Beresford, of the Idaho University (U.S.A.), on "Electricity Supply in the Farming Districts of the State of Idaho," and one by Signor A. Alpe, of the Regio Institute Superiore Agrario of Milan, on "Electrical Moto-culture."

English 132-kV Grid Line in Operation.

We learn from Mr. R. W. L. Phillips, M.I.E.E., borough electrical engineer, Bedford, that the national grid line on the Bedford—Little Barford route was put into commission at 1.5 p.m. on September 10th, and that bulk supply from Bedford to the Cambridge and Huntingdon districts is now transmitted at 132 kV. This is stated to be the first occasion that a grid line has been put into commercial operation in England at 132 kV.

Yacht Electrical Equipment.

The electric installation on a yacht designed and built by Ramage & Ferguson. Ltd., to the order of H.H. Prince Youssouf Kamal, Cairo, includes two large generators, storage batteries, a searchlight on the foremast, and a 1½-kW Marconi installation which is similar to what is fitted in the largest passenger liners. A refrigerating machine with large insulated chambers is also fitted, together with the "Thermotank" system of ventilation throughout the vessel.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

Mr. D. H. Morris, of Dundee, has been elected president of the Electrical Contractors' Association of Scotland. In 1897 he entered upon his training with Messrs. Lowdon Bros. and Co., of Dundee, and in 1901 he became branch manager for that firm in Glasgow. During the war he was in the Experimental and Research Division of the Admiralty where submarine protection and destruction occupied attention. He subsequently returned to Messrs. Lowden as general manager, later becoming a director. To-day he is in business on his own account in Dundee and, according to the local Press, he recently carried out the Glamis Castle electrical installation. Mr. Morris is a member of the Association of Mining Electrical Engineers, and in 1920-22 was chairman of the Dundee Branch of the E.C.A. of Scotland.

Mr. J. A. Attwooll, inspector of the telephone engineering department of the Post Office at Weymouth, who is retiring after 40 years' service, has been presented by his colleagues with an armchair.

Col. Sir Henry George Lyons, F.R.S., D.Sc., F.Inst.P., F.R.A.S. (Director and Secretary of the Science Museum), has accepted the invitation of the Council of the Junior Institution of Engineers to become president in succession to Sir Ernest William Moir, Bart., M.Inst.C.E., and his induction will take place at a meeting to be held on December 12th at the Royal Society of Arts, on which occasion he will deliver his address.

Mr. L. G. Hurwood, president of the Electrical Federation of Victoria, recently left Melbourne for Brisbane, where he undertakes the management of the Australian General Electric Co.'s business. At a farewell luncheon Mr. G. L. Just, general manager for Australia of the Edison-Swan Electric Co., Ltd., presented Mr. Hurwood with a gold wristlet watch on behalf of the Federation. Mr. Just, who was president last year, has been elected by the council to succeed Mr. Hurwood.

Mr. A. S. Richards, who is with the Cleveland and Durham County Electric Power Co. at Middlesbrough, was married last week at Linthorpe, Middlesbrough, to Miss Ida Lithgow.

Mr. A. J. Giffin has taken up an engineering appointment on the Continent, and he asks us to state that his address is 48, Rue Ampère, Paris.

Mr. T. E. H. Birley, playing in the Autumn Golf Tournament of the Cable Makers' Association at St. George's Hill, Weybridge, Surrey, on Thursday last week, holed his tee shot at the 3rd hole, measuring 178 yards.

On September 15th the staff of the Liverpool Corporation Electric Supply Department presented a canteen of cutlery of 130 pieces to **Mr. P. J. Robinson** on the occasion of the celebration of his silver wedding, as a token of the esteem in which he is held. Councillor F. C. Wilson, chairman of the Tramway, Electric Power and Lighting Committee, made the presentation, and several members of the staff added their tributes.

We learn that the Royal Photographic Society has accepted for exhibition a number of technical photographs prepared by **Mr. A. W. Swan,** Publicity Manager of Messrs. Evershed and Vignoles, Ltd.

Obituary.

Mr. F. E. Worsdell.—Brief mention was made in our last issue of the death of Mr. Frederick Ernest Worsdell, assistant sales manager of Callender's Cable and Construction Co., Ltd., at the comparatively early age of 52 years. Mr. Worsdell, who had been ill for some time, was well-known throughout the electrical industry. He had been in the service of Callender's since 1898 and the company has paid tribute to his ability, enterprise, and unselfish devotion to its interests, particularly during the past few months, when in spite of distressing pain he persisted in carrying on his work. He was highly esteemed as a colleague and as a personal friend.

The funeral took place at St. James's Church, Kidbrooke, on September 9th, and was attended, in addition to the family of the deceased, by Sir Tom Callender (managing director) and Lady Callender, Mr. Theodor Petersen (assisting managing director), Mr. P. V. Hunter and Mr. Chas. Pipkin (joint managers), Mr. Howard Foulds (secretary), and Mr. W. G. Hendrey (overseas manager), Mr. Llewellyn B. Atkinson (director of Cable Makers' Association), Mr. J. Snow Huddleston (of Union Cable Co., Ltd.), Mr. J. E. Proctor (of London Power Company), Mr. Waterhouse (of Cable Makers' Association), Mr. Bunting (of Henley's Telegraph Works, Ltd.), Mr. T. E. H. Birley and Mr. Lavell (of Macintosh Cable Co.), Mr. Easton (of Siemens Bros. & Co., Ltd.), Mr. A. J. Gillanders (of Standard Telephones and Cables, Ltd.), and a very large number of the staff of Callender's Cable and Construction Co., Ltd., including the head offices, the works, and the branches in the country, which was a striking tribute to the regard in which Mr. Worsdell was held, and to the sympathy with the family.

Swaine [*London.*

The late Mr. F. E. Worsdell.

Mr. P. H. Allin.—The death is announced of Mr. Phillip Henry Allin, founder in 1885 of the business of P. H. Allin and Sons, electrical and heating engineers, of Bridge Street, Cambridge. Three of Mr. Allin's sons are partners in the firm; Mr. S. W. Allin is associated with the electrical department.

Mr. F. G. Northwood.—The death has occurred, after an operation, of Mr. Francis George Northwood, who had for a long period been engaged at the Luton Corporation Electricity Works. He was 72 years of age.

Wills.—Mr. J. E. H. Waller, M. Inst. C.E., of Messrs. Switchgear & Cowans, Ltd., of Manchester, who died in July at the age of 73 years, left £47,035 gross and £46,883 net personalty. According to *The Times*, he left 500 shares in the company named to Mr. Joseph Sermon, "in recognition of his valuable services."

Mr. F. S. Newall, chairman of the Waste Heat and Gas, Electrical Generating Stations, and other companies, left unsettled property valued at £807,384.

The late **Mr. C. C. Wharton,** of Rugby, left £8,311 gross and £5,969 net personalty.

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares.

New Companies Registered.

Radio Disposals, Ltd.—Private company. Registered September 6th. Capital, £1,000 in £1 shares. Objects: To purchase and dispose of the surplus stocks and goods of radio and wireless dealers and manufacturers, &c. The permanent directors are: M. Hacker, 28, Clyde Road, West Didsbury, Manchester, merchant; M. Lautenberg, Ashdown, Middleton Road, Crumpsall, Manchester. Solicitor: J. Prior, 7, Brazennose Street, Manchester.

Elcordon, Ltd.—Private company. Registered September 6th. Capital, £1,000 in £1 shares. Objects: To carry on business as agents for, manufacturers, exporters and importers of, and to buy, sell and deal in gramophones, radio gramophones, voice and sound producing and amplifying machines and instruments, automatic machines, accumulators and batteries, wireless aerials and receiving and transmitting sets, &c. The subscribers (each with one share) are: R. C. Blum, articled clerk, and F. C. Winter, clerk, 3/4, Clement's Inn, W.C.2. Solicitors: Buckeridge & Braune, 3/4, Clement's Inn, W.C.2.

Electric Supplies & Tools Co., Ltd.—Private company. Registered September 6th. Capital, £2,000 in £1 shares. Objects: To acquire the businesses now carried on at 71, Middle Street, Brighton, and at 54, Cheapside, E.C., as "T. M. Johns & Co." and "H. Heidt," and to carry on the business of engineers' agents, and importers and exporters and wholesale suppliers of electrical goods and tools of all kinds; electrical, wireless, mechanical and general engineers, &c. The directors are: T. M. M. Johns, 2, Walpole Terrace, Kemp Town, Brighton; H. Heidt, 12, Noel Street, N.1 (both permanent, subject to each holding 100 shares). Registered office: 54, Cheapside, E.C.

Northern Utilities Trust, Ltd.—Registered as a private company on September 11th. Nominal capital of £1,000 in 2s. shares. Objects: To carry on the business of a financial and investment trust in all its branches, with the object (inter alia) of assisting in the development of the engineering and electrical industries. The first directors are: Lt.-Col. H. C. Frazer, D.S.O., 9, Bainbridge Road, Leeds, engineer; J. E. Rylands, 68, Trumptington Street, Cambridge, gentleman. Qualification: £50. Registered office: Permanent House, Headrow, Leeds.

Official Returns of Electrical Companies.

Pullars Electric Co. (Brighton), Ltd.—Charge dated September 1st. 1930, to secure £300. Property charged: Land and buildings thereon at rear of 95, Hollingbury Road, Brighton, together with passageway thereto. Holder: R. Kelsey, Flat 4, No. 4, Third Avenue, Hove.

Plessey Co., Ltd.—Debenture dated August 29th, 1930, to secure advances up to £6,000, charged on freehold land, buildings, &c., at Vicarage Lane, Ilford, and the company's undertaking and property, present and future, including uncalled capital and goodwill. Holders: Columbia Graphaphone Co., Ltd., 102, Clerkenwell Road, E.C.

Atomlite (Parent Company), Ltd.—Satisfaction to the extent of £6,250 (being amount issued, the balance having been cancelled) on April 8th, 1930, of debentures for £7,250 authorised January 28th, 1930, and registered February 10th, 1930. (The particulars filed on February 10th, 1930, incorrectly showed that £7,250 had been issued.)

Edward Dewhurst, Ltd.—Mortgage dated May 22nd, 1906, charged on warehouse, storerooms, &c., in Mount Street, Preston (property acquired December 8th, 1921) on which £1,000 was owing on November 1st, 1929. (Now registered pursuant to Section 91 of the Companies Act, 1929.) Mortgagee: Mrs. J. Winwood, Long Lane, Ashton-on-Ribble.

Sea Houses and District Electric Supply Co., Ltd.—Capital, £5,000 in £1 shares. Return dated May 5th. 1930. 3,010 shares taken up. £3,010 paid. Mortgages and charges, £269 7s. 11d.

Melton Mowbray Electric Light Co., Ltd.—Capital, £60,000 in £5 shares. Return dated May 9th, 1930. 9,600 shares taken up. £48,000 paid. Mortgages and charges, £19,100 debentures.

Lewes and District Electric Supply Co., Ltd.—Capital, £50,000 in 1,250 preference and 3,750 ordinary shares of £10 each. Return dated June 17th, 1930. 3,750 ordinary shares taken up. £37,500 paid. Mortgages and charges, £20,000.

Direct Spanish Telegraph Co., Ltd.—Capital, £95,000 in 6,000 preference and 13,000 ordinary shares of £5 each. Return dated June 12th, 1930. 6,000 preference and 12,931 ordinary shares taken up. £94,655 paid. Mortgages and charges, £94,000 4½ per cent. debentures.

Birkdale and District Electric Supply Co., Ltd.—Capital, £50,000 in £5 shares. Return dated June 17th, 1930. 9,200 shares taken up. £46,000 paid. Mortgages and charges, £25,000.

J. S. Ramsbottom & Co., Ltd.—Capital, £1,000 in £1 shares. Return dated June 18th, 1930. All shares taken up. £1,000 paid. Mortgages and charges, nil.

London Platino-Brazilian Telegraph Co., Ltd.—Capital, £400,000 in £10 shares. Return dated July 24th, 1930. 37,480 shares taken up. £374,800 considered as paid. Mortgages and charges, nil.

Babcock & Wilcox, Ltd.—Capital, £4,620,000 in 100,000 6 per cent. preference, 200,000 5 per cent. second preference, and 4,320,000 ordinary shares of £1 each. Return dated May 19th, 1930. 100,000 6 per cent. preference, 179,056 5 per cent. second preference and 4,299,656 ordinary shares taken up. £1,029,884 paid on 179,056 second preference and 850,828 ordinary shares. £3,548,828 considered as paid on 100,000 6 per cent. preference and 3,448,828 ordinary shares. Mortgages and charges, nil.

Hampshire Light Railways (Electric) Co., Ltd.—Capital, £1,000 in £10 shares. Return dated April 17th, 1920. All shares taken up. £1,000 paid. Mortgages and charges, nil.

Richmond (Surrey) Electric Light & Power Co., Ltd.—Capital, £200,000 in £1 shares. Return dated May 22nd, 1930. All shares taken up. £200,000 paid. Mortgages and charges, nil.

China and Japan Telephone & Electric Co., Ltd.—Capital, £75,000 in £1 shares. Return dated May 27th, 1930. 39,761 shares taken up. £25,000 paid. £14,761 considered as paid. Mortgages and charges, nil.

Anemostat, Ltd.—Charge created by the receiver and manager on the company's undertaking and property, dated August 14th, 1930, to secure £400. Holder: E. A. Merrick, Stella Bella, Stanley Road, Broadstairs, Kent.

Northleach Electric Supply Co., Ltd.—Capital, £3,000 in £1 shares. Return dated April 1st, 1930. 2,120 shares issued and fully paid up. Mortgages and charges, nil.

Truro Electricity Supply Co., Ltd.—Capital, £5,000 in £1 shares. Return dated April 24th, 1930. 404 shares taken up. £404 paid. Mortgages and charges, nil.

Howells (Electric Motors), Ltd.—Mortgage on 105, 109, 111 and 113, York Street, Hanley, Stoke-on-Trent, land with buildings thereon in York Street, occupied by the company as an engineering works, with machinery fixtures, &c., dated August 16th, 1930, to secure all moneys due or to become due from the company to the Midland Bank, Ltd.

City Notes.

General Electric Co.

It is announced in the Press that this company will publish on Monday next a prospectus of an issue of £3,500,000 five per cent. debenture stock. The object of the issue is to redeem the existing 7 per cent. debenture stock of which about £3,000,000 is outstanding. The details are not available at the moment of going to press, but it is understood that prospectuses will be available on Friday evening.

The Zurich Electrical Bank.

The Bank fur Elektrische Unternehmungen of Zurich reports that the net profits have increased from 9,789,000 fr. in 1928-29 to 9,837.000 fr. in the past year. The dividend, which has been stable at 10 per cent. for some years past, is proposed to be raised to 12 per cent. Through the settlement of large

transactions and the liquidation of engagements amounts are stated to have become free which, taken in conjunction with a higher valuation of shares and participations, represent a sum of 28.50 million fr., which has been placed to the reserve fund, thus bringing this fund to 45 million fr. or to 60 per cent. of the share capital.

Bahia Tramway, Light and Power Co.

The *London Gazette* announces to holders of 5 per cent. 50-year first mortgage gold debentures, that in pursuance of an Order of the High Court made on July 28th last, payment of 12 per cent. on account of the nominal amount of principal sums represented by each of the bearer debentures issued by the company has been ordered to be made to the holders thereof. Holders desiring to receive payment are required within two years from July 30th last to produce their debentures to Mr. B. H. Binder, River Plate House, South Place, E.C.2.

International Telephone & Telegraph Corporation.

An *Exchange Telegraph* message to the daily Press states that the consolidated net income, including that for associated companies, for the six months ended June 30th last, amounted to $6,826,830, as compared with $7,808,440 for the corresponding period of 1929. The net income is equivalent to $1.04 per share, there being 6,580,559 shares in the capital stock. On this the directors have voted a quarterly dividend of 50 cents per share.

Power Corporation of Canada.

The report for the year ended June 30th last records gross earnings of $3,702,912, as against $3,312,104 in the preceding year, and net earnings of $2,478,958 ($2,445,829). Preferred dividends absorb $600,000, while the amount distributed on the common stock was $890,573 (against $394,842). The surplus carried forward is increased from $2,502,919 to $3,491,304.

Venezuela Telephone & Electrical Appliances Co., Ltd.

According to the *Financial News*, at an extraordinary general meeting held on September 10th, a resolution was carried enlarging the borrowing powers of the board and sanctioning the fusion of the interests of the company with the Compania Anonima Nacional Telefonos de Venezuela.

Llanelly & District Electric Supply Co., Ltd.

The report for 1929 shows a profit of £53,029, as compared with £52,426 in the preceding year, to which is added £3,327 brought forward. After providing for debenture interest, &c., a dividend of 2½ per cent., less tax, is paid on the ordinary shares and £3,122 is carried forward.

Midland Electric Corporation for Power Distribution, Ltd.

An interim dividend has been declared on the ordinary shares of 2½ per cent. (actual), less tax.

Associated Telephone & Telegraph Co.

Dividends have been declared on the class "D" and class "A" stocks of $1.00 per share, payable October 1st.

British Aluminium Co., Ltd.

The directors have declared an interim dividend of 4 per cent., actual, less tax, on the ordinary shares.

Rangoon Electric Tramway and Supply Co.

An interim dividend has been declared of 8 annas per share, free of Indian tax, on ordinary shares Nos. 1 to 400,000 (same).

Bell Telephone Co. of Canada.

A quarterly dividend has been declared of 2 per cent. on the capital stock.

British Insulated Cables, Ltd.

An interim dividend of 5 per cent. (same) on the ordinary shares is announced.

Associated Fire Alarms, Ltd.

A dividend of 8 per cent., less tax, has been declared on the ordinary shares.

Electrical Finance & Securities Co., Ltd.

An interim dividend is announced of 5 per cent., less tax, on the ordinary shares (against 4 per cent.).

Automatic Telephone Manufacturing Co., Ltd.

The directors have announced an interim dividend of 3¾ per cent., less tax (same).

International Automatic Telephone Co., Ltd.

An interim dividend of 3¾ per cent., less tax, has been declared.

National Electric Construction Co., Ltd.

An interim dividend has been declared of 5 per cent., less tax.

British Columbia Power Corporation.

The Vancouver correspondent of the *Financial Times* reports that despite the dry spell last summer, with the consequent water shortage for power generation, the company closed its fiscal year with an increase in revenue from all sources of $753,077 over the previous year. The market extension in motor transport reduced the number of passengers carried by over 1,000,000 persons, and owing to depressed trade conditions less freight was handled. The higher revenues were mainly due to increased sales of electricity and gas. The gross revenue was $15,434,341 and expenses totalled $11,144,434, the surplus for the year being $188,194.

Stocks and Shares.

TUESDAY EVENING.

THE feature of the week in the markets with which we deal has been lively fluctuation in the price of Metropolitan Railway consolidated stock. Revival of the rumour that the company is to be taken into the Underground Electric Railways of London had the effect of putting up the price to 75, which showed a jump of 7 points on the week, an extraordinary movement for a stock usually so placid as Metropolitan consolidated. Narrowness of market contributed to the sharpness of the rise. Proprietors of the stock have been on the look-out for something of this sort for a long time past, but up to the present it has been understood that the terms asked by the Metropolitan were too high for the Underground Electric Railways to agree to. In the old days it was always the Great Western with which the Metropolitan was on the point, according to the supporters of the stock, of being allied. Of late years, the Underground Electric Railways has been expected, at some time, to absorb the only link in the underground system of which the merger has not control. The Stock Exchange rumour which caused the recent rise brought forth a denial from one of the directors of the Metropolitan Railway, but the statement was couched in a manner which did not entirely slam the door in the face of expectation, and although the price subsided from 75, it still shows on the week an advance of 3 points at 71. Underground Electric ordinary shares eased off to 24s. 6d.

Apart from the little excitement which the Metropolitan incident caused, the market in the stocks and shares of companies connected with electricity has been, generally speaking, quiet. Further progress occurred in the recovery amongst shares of electrical manufacturing and equipment companies. Cables & Wireless stocks are lower on the week.

Manufacturing and Equipment.

Henleys have risen to £6, at which the yield on the money is once more 5 per cent. British Insulated have risen to 3 11/16. The company has declared its usual interim dividend of 5 per cent. Enfield Cable ordinary advanced ¼ to 4¼. Siemens held their rise at 23s. 9d., and Callenders are 1/16 up at 3 7/16. Brush ordinary remains at 110. Business has been done at 106 and 107. General Electric ordinary at 48s. 3d. have shed 6d. The company is on the point of making a new debenture issue of 3½ million pounds in 5 per cent. stock at 98. There was considerable demand for the underwriting, and it is thought that the prospectus will be out at the end of this week.

A leading firm of Stock Exchange brokers points out in a letter issued to its clients that the cheapening of electric power, together with the increase of supplies, will mean an all round reduction in costs for British manufacturers. The Central Electricity Board, the firm remarks, was formed for this purpose, and although enormous strides have been made, the effect has as yet barely been felt.

On Revival of Trade.

The argument proceeds on the lines that any revival of trade will come as an impetus to the demand for power, and this will, in turn, increase the demand for electrical machinery and equipment. The possibility of Government action regarding tariffs, and the maturing of the cheap power scheme, are good reasons, in this opinion, for anticipating an improvement in trade, without taking into consideration the normal recovery which is now due. They indicate, as useful investments, shares in the Midland Counties Electric, Newcastle-on-Tyne Electric Supply, Yorkshire Power, Scottish Power, and Lancashire Electric, adding another list which includes the shares of Associated Electrical Industries, General Electric, Crompton Parkinson, and Brush Electrical Engineering.

Interim Dividends.

The Midland Electric Corporation for Power Distribution announces an interim dividend of 2½ per cent. less tax, being the same as that of a year ago. The Electrical Finance and Securities Company has advanced its interim dividend from 4 per cent. of a year ago to 5 per cent. now, and the price of the shares is harder at 44s. 6d. The 7 per cent. preference changed hands to-day, Tuesday, at 22s. 10½d., and the 5½ per cent. debenture stock at 99. National Electric Construction ordinary at 23s. are unaffected by declaration of a 5 per cent. dividend. Edmundsons' 5 per cent. debenture, issued at 93½, is steady at 2½ premium. Newcastle-on-Tyne 5 per cent. debenture is 4¼ premium above the price of 96 at which the stock was offered.

Electricity Supply Shares.

Amongst electricity supply shares, the quotation of a number of the ordinary shares at the Stock Exchange Account Day last week was followed by very little alteration in prices. In other words, the amounts of the deductions were automatically recovered. Most of the ordinary shares in this group are now ex the interim dividends, and the market as a whole remains as firm as ever, the principal difficulty being, as previously mentioned, to obtain the shares which buyers are anxious to acquire. Bournemouth and Poole at 58s. 9d., and Chelseas at 27s. have improved. Metropolitan continue to be bought by people who are looking ahead, and who disregard the immediate yield of £4 17s. which the shares offer. County of London ordinary shares are also the subject of mild speculation, and the modesty of the return afforded by these, namely, £4 5s. 6d. per cent., evidences the hopefulness with which the future is regarded. Northamptons have strengthened to 42s. 6d., Egham and Staines are 29s. 9d., Isle of Thanet ordinary 26s., and the preference 23s. 3d. The 4 per cent. debenture has risen to 78. Richmond (Surrey) remain at 40s. 6d. Scottish Power new shares are quoted at 3d. premium. Whitehall Investments 6 per cent. first mortgage debenture stock has risen to 106. On the other hand, the 7 per cent. participating debenture stock of the Perak River Hydro-Electric has gone back to 97½. The fall in the latter stock seems to be due to nervousness engendered by the unhappy condition into which tin—the industry—has fallen. The ordinary shares are quoted at 8s.

Telegraphs and Telephones.

Cables & Wireless 5½ per cent. preference stock is now quoted ex the dividend of 2¾ per cent. gross, and the price at 80 is 1¼ down, allowing for the dividend. The 7½ per cent. "A" ordinary has gone back to 27½, and the "B" stock is lower at 14½. There is nothing like so much doing in the stocks, now, as there was two or three weeks ago; speculative interest seems to have died out of them for the time being. Globe Telegraph ordinary at 15¾ are ex the 5s. net dividend. The price touched 16, but reacted to the former figure. Automatic Telephones are better at 32s. 6d., following upon their drop last week. The company has declared an interim dividend of 3¾ per cent. less tax, payable on the 1st of next month, and the International Automatic Telephone declares an interim dividend at the same rate. Both of these are unchanged from the dividends of a year ago. American Telephone and Telegraph has been down to 220, but rallied to 223. International Telephone & Telegraph shares are a little better at 44½. The company announces that the consolidated net income for the six months ended June 30th came to a little under seven million dollars, a decrease of about a million dollars as compared with the corresponding period of 1929. A quarterly dividend of 50 cents has been declared.

The Postal Telegraph & Cable Corporation, a subsidiary of the International Telephone & Telegraph, has made arrangements with various standard oil companies in the United States whereby petrol-filling stations will accept telegrams. The Postal Telegraph Corporation has 7,000 stations, and is aiming at the establishment of 40,000 in all.

Tramways and Tractions.

Anglo-Argentine Tramways 5 per cent. debenture shows a gain of 3. The first preference shares, the price of which was down to 37s. 6d. a fortnight ago, has recovered to 47s. 6d., in sympathy with the improvement which has occurred in most of the other Argentine securities. The bloodless character of the revolution served to restore confidence that was somewhat rudely shaken by the first vague cables which arrived in regard to the *coup d'etat*. British Electric Traction deferred has moved up 25 points to 1,475. Brazilian Tractions are a little harder at 38.

Latin-America Stocks.

Power Corporation of Canada at 71 lost 2 of the 4½ points that they gained last week on the issue of the very satisfactory report. Shawinigan Water, which went up to 74, have gone back to 72. Winnipeg Electric 5 per cent. refunding stock is better at 88. Vancouver Power 4¼ per cent. debenture at 81½, and British Columbia 4½ per cent. debenture at 83½, are both higher. There has been a marked disposition to buy bonds and prior-share stocks of Canadian companies, utility and others. In the Mexican group, no fresh changes of consequence have occurred.

Miscellaneous Matters.

Philips Lamps shares at 2⅝ are a shade lower than they were a week ago. Calcutta Electric strengthened to 44s. 9d., Atlas ordinary to 25s. 3d. Conditions in the iron and steel industry are not sufficiently encouraging to bring in many buyers for shares in the undertakings concerned with the trade. Babcocks at 55s. show no alteration. The rubber market continues flat, with the price of the produce revolving around 4d. per lb., at which quotation there are very few companies that can make their working costs, much less a profit upon their output. India-Rubber shares at 7s. 6d. are 1s. 9d. lower. On the other hand, Associated Electrical Industries put on a few pence at 25s. A curious movement is that of 1/16 rise in English Electric preference to 11s. 3d.—curious, because business is marked at 9s. and at 9s. 6d. in the shares.

Share List of Electrical Companies.

HOME ELECTRICITY COMPANIES.

	Nom.	Approx. Dividend. 1928.	1929.	Price Sept. 16 1930.	Rise or fall	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	58/9	+1/16	5 2 0
Brompton Ordinary	1	8½	8½	26/6xd	—	5 5 8
Charing Cross Ordinary	1	8½	8½	27/6	—	5 1 10
do. do. 4½% Pref. ...	1	4½	4½	18/-	—	5 0 0
Chelsea	1	8¼	8¼	27/6xd	+1/-	5 3 8
City of London	1	10	10	33/9xd	—	4 8 1
do. do. 6% Pref.... ...	1	6	6	23/6	—	5 2 2
Clyde Valley	1	8	8	37/6xd	—	4 5 4
County of London	1	7	10	46/9xd	+1/16	4 5 6
do. do. 6% Pref.... ...	1	6	6	23/6	—	5 2 2
Edmundson's 7% Pref.	1	7	7	24/-	—	5 16 8
Elec. Supply Corporation	1	11	11	47/-	—	4 13 7
Kensington Ordinary	1	8	8	27/-	—	5 3 8
Lancs. Light and Power	1	7½	7	24/-	—	5 16 8
London Electric	1	8½	9	30/-	—	4 18 4
Metropolitan	1	9	10	2⅛	—	4 17 1
do. 4½% Pref.	1	4½	4½	17/-	—	5 6 0
Midland Counties	1	6½	7	28/6	—	4 18 3
Mid. Elec. Power	1	15	8	30/-	—	5 6 8
Newcastle-on-Tyne Ordinary ...	1	6	6	23/9	—	5 1 1
do. 7% Pref.	1	7	7	27/-	—	5 3 8
Notting Hill 6% Pref.	10	6	6	10⅝	—	5 11 4
North Met. Elec. 6% Pref.... ...	1	6	6	23/6	—	5 2 2
St. James' and Pall Mall	1	8	8	27/6	—	5 1 10
Scottish Power	1	8	8	28/6	—	5 12 4
South London	1	8½	8½	27/-xd	—	5 3 8
Urban Ordinary	1	7	7	27/6	—	5 1 10
Westminster Ordinary	1	8½	8½	27/6	—	5 1 10
Whitehall Elec. Invst. 7½% Pref....	1	7½	7½	24/6	—	6 2 5
Yorkshire Elec.	1	8	8	31/3	—	5 2 5

HOME RAILS.

Central London Ord. Assented ...	Stock	4	4	77	—	5 4 0
Metropolitan	,,	3½	4	71	+3	5 12 8
do. District	,,	4	5	75½	—	6 12 5
Underground Electric	£1	7	8	24/6	—6d.	6 10 8
do. do. Income ...	Bonds	6	6	104	—	5 15 5

TELEGRAPHS AND TELEPHONES

Anglo-Am. Tel. Pref.	Stock	6	6	101	—	5 19 0
do. Def.	,,	1½	1½	25	—	6 0 0
Automatic Telephone	1	10	12½	32/6	+1/16	7 13 10
Cables & Wireless 5½ Pref.... ...	Stock	—	5½	80xd	—1½	6 17 6
do. A 7½ Ord.	,,	—	—	27½	—1	... ...
do. B Ord.	,,	—	—	14½	—1	... ...
Globe Tel. and T. Ord.	10	10	10	15¾xd	—	*6 7 6
do. do. Pref.	10	6	6	10⅞xd	+⅛	5 11 7
Great Northern Tel.	10	20	20	30	—	6 13 4
Marconi-Marine	1	12½	15	37/6	—	8 0 0
Oriental Telephone Ord.	1	12	12	51/3	—	*4 13 7

HOME AND FOREIGN TRAMS, &c.

Anglo-Arg. Trams First Pref. ...	5	5½	5½	2⅜	+¼	11 11 6
do. do. 2nd Pref. ...	5	6	6	1½	—	17 8 0
do. do. 5% Deb. ...	Stock	5	5	59	+3	8 9 6
British Electric Traction Def. Ord.	,,	5	5	1475	+25	... ...
do. do. Pref. Ord.	,,	8	8	123½	—	6 6 6
Brazil Traction	100	7	8	37	—	5 8 1
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	91½	—	5 9 8
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	9/-	—	... ...
London United Tram Deb. ...	Stock	4	4	52½	—	7 12 4
Mexico Trams, 5% Bonds	—	5	5	57	—	8 15 6
Mexican Light Common	100	Nil	Nil	69½	+7	... ...
do. 7% Pref.	100	7	7	76½	—	9 3 0
do. 1st Bonds	—	5	5	79	—	6 6 7
Victoria Falls Ord.	1	15	15	3⅜	+3/32	4 19 0
Yorkshire (West Riding)		Nil	Nil	5/-	—	... ...

MANUFACTURING COMPANIES.

Assoc. Elec. Ord.	1	6	6	25/-	+6d.	4 16 0
Babcock & Wilcox	1	13	15	55/-	—	*5 9 1
British Aluminium Ord.	1	10	10	2	—	5 0 0
British Elec. Transformer Pref. ...	1	7	7	9/9	—	... ...
British Insulated Ord.	1	15	15	3⅛	+1/16	4 1 4
Brush Ord.	Stock	10	10	110	—	9 1 10
Callenders	1	15	15	3⅞	+1/16	4 7 3
do. 6½% Pref.	1	6½	6½	23/9	—	5 9 5
Crompton Parkinson Ord.	5/-	—	20	23/9	—	6 6 4
do. 8% Pref.	1	8	8	25/9	—	6 4 8
Edison-Swan 1st. Pref.	1	7½	7½	26/3	—	5 14 3
do. 5% Deb.	Stock	5	5	84½	—	5 18 4
Electric Construction	1	5½	5	12/-	—	8 6 8
Enfield Cable Ord.	1	20	25	4¼	+⅛	5 17 8
English Electric	1	Nil	Nil	12/6	—	... ...
do. do. Pref.	1	8	Nil	11/3	+1/16	... ...
Gen. Elec. Pref.	1	6½	6½	23/9	—	5 9 5
do. Ord.	1	10	14	48/3	—6d.	5 16 2
Henley	1	25	30	6	+⅛	5 0 0
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	Nil	Nil	7/6	—1/9	... ...
Johnson & Phillips	1	10	10	1⅝	—	5 6 8
Siemens Ord.	1	7½	7½	23/9	—	6 6 4
Telegraph Construction	12	10	10	19	—	*6 6 7

* Dividends paid free of Income Tax.

Swiss Foreign Electrical Trade.

Imports and Exports in 1928 and 1929.

THE following statistics, showing the import and export trade of Switzerland in electrical and allied goods in 1929, have been taken from the recently-issued official trade returns. The figures for 1928 have also been given, and notes added of any increases or decreases. The returns show the most important of the countries of origin or destination of the goods.

Imports.

	1928. Thous. fr.	1929. Thous. fr.	Inc. or dec. Thous. fr.
Electrical cable, not insulated—			
Total	65	60	− 5
From Germany	36	29	− 7
„ France	21	24	− 3
„ United States	7	5	− 2
Insulated cable not lead covered or iron armoured—			
Total	324	309	− 15
From Germany	287	262	− 25
„ France	31	27	− 4
Cable covered with lead—			
Total	503	57	− 446
From Germany	502	56	− 446
Cable covered with lead and iron armoured—			
Total	298	137	— 161
From Germany	294	137	− 157
Cable insulated with rubber or paper and covered with textiles—			
Total	440	789	+ 349
From Germany	255	332	+ 77
„ France	38	60	+ 22
„ Holland	118	269	+ 151
„ Great Britain	11	9	− 2
„ Belgium	•	100	—
Cable ditto covered with lead—			
Total	423	557	+ 134
From Germany	361	471	+ 110
„ Belgium	33	74	+ 41
„ Great Britain	17	3	− 14
Dynamo-electric machines and transformers—			
Total	3,518	4,366	+ 848
From Germany	1,895	2,265	+ 370
„ France	449	314	− 135
„ Italy	73	156	+ 83
„ United Kingdom	129	214	+ 85
„ United States	277	449	+ 172
„ Holland	632	888	+ 256
Accumulators and batteries—			
Total	4,642	6,321	+1,679
From Germany	1,947	3,001	+1,054
„ Italy	72	97	+ 25
„ France	540	660	+ 120
„ United States	192	193	+ 1
„ Austria	212	187	− 25
„ United Kingdom	1,577	2,045	+ 468
Steam engines, cranes, pumps, turbines, &c.—			
Total	343	448	+ 105
From Germany	249	274	+ 25
„ United Kingdom	30	156	+ 126
„ United States	60	•	—
Electric incandescent lamps, mounted—			
Total	3,482	3,550	+ 68
From Germany	1,062	1,200	+ 138
„ Austria	320	294	− 26
„ Holland	1,543	1,560	+ 17
„ France	201	210	+ 9
„ Hungary	272	200	− 72
Insulators, mounted—			
Total	431	486	+ 55
From Germany	149	296	+ 147
„ United States	185	39	− 146
„ Denmark	80	133	+ 53
Electric meters—			
Total	676	823	+ 147
From Germany	590	682	+ 92
„ France	36	55	+ 19
Telegraph and telephone apparatus—			
Total	6,973	16,420	+9,447
From Germany	3,168	5,721	+2,553
„ United Kingdom	610	799	+ 189
„ Sweden	106	69	− 37
„ France	520	589	+ 69
„ Belgium	672	2,480	+1,808
„ United States	334	856	+ 522
Electrical apparatus not elsewhere mentioned—			
Total	5,016	4,619	− 397
From Germany	2,642	3,018	+ 376
„ France	244	188	− 56
„ United Kingdom	1,377	888	− 489
„ United States	126	187	+ 61

Exports.

Dynamo-electric machines and electric transformers of all kinds—			
Total	36,364	37,625	+1,261
To Germany	2,489	1,738	− 751
„ Austria	996	974	− 22
„ France	1,495	3,052	+1,557
„ Italy	1,657	1,523	− 134
„ Belgium	1,756	2,772	+1,016
„ United Kingdom	518	1,259	+ 741
„ Egypt	347	867	+ 520
„ Spain	7,397	3,874	−3,523
„ British India	60	460	+ 400
„ Poland	3,243	2,701	− 542
„ Rumania	880	1,252	+ 372
„ Brazil	614	695	+ 81
„ Argentina	1,136	1,304	+ 168
„ Netherlands	1,647	1,627	− 20
„ Norway	444	1,623	+1,179
„ Netherlands Indies	836	1,348	+ 512
„ China	253	529	+ 276
„ Japan	2,908	905	−2,003
„ Peru	265	87	− 178
„ Australia	821	832	+ 11
Accumulator batteries, electrodes in combination with rubber or celluloid—			
Total	434	655	+ 221
To France	46	27	− 19
„ Italy	9	18	+ 9
„ United Kingdom	35	47	+ 12
„ Spain	15	27	+ 12
„ Argentina	261	394	+ 133
Insulators, mounted—			
Total	64	176	+ 112
To Italy	1	3	+ 2
„ Spain	13	82	+ 69
„ United Kingdom	2	3	+ 1
„ United States	4	2	− 2
„ Germany	•	20	—
„ Austria	•	32	—
Electric cable, not insulated—			
Total	2,284	2,416	+ 132
To France	313	74	− 239
„ Austria	201	399	+ 198
„ Italy	108	106	− 2
„ United Kingdom	1,058	846	− 212
„ Czecho-Slovakia	189	194	+ 5
Cable, insulated, not lead covered or iron armoured—			
Total	704	1,122	+ 418
Cable, lead covered—			
Total	77	86	+ 9
To France	1	3	+ 2
„ Spain	9	9	—
„ Poland	45	40	− 5
Cable, lead-covered and iron armoured—			
Total	104	152	+ 48
Cable, insulated with rubber or paper and covered with textiles—			
Total	771	666	− 105
To France	22	39	+ 17
„ United Kingdom	596	490	− 106
„ India	46	58	+ 12

	1928. Thous. fr.	1929. Thous. fr.	Inc. or dec. Thous. fr.
Cables, ditto, covered with lead—			
Total	18	40	+ 22
To Spain	2	2	—
,, Bulgaria	*	25	
Electric locomotives—			
Total	5,672	626	−5,046
To United Kingdom	28	2	− 26
,, Spain	3,451	115	−3,336
,, India	1,372	88	−1,284
,, Brazil	*	380	—
Telegraph and telephone apparatus—			
Total	1,812	1,363	− 449
To France	204	318	+ 114
,, Italy	336	146	− 190
,, Germany	47	57	+ 10
,, Spain	4	13	+ 9
,, Holland	501	66	− 435
,, Greece	5	11	+ 6
,, United Kingdom	65	91	+ 26
,, Belgium	50	50	—
,, Chile	424	2	− 422
,, Egypt	17	5	− 12
Electric incandescent lamps, mounted—			
Total	3,579	4,103	+ 524
To Austria	308	36	− 272
,, France	84	121	+ 37
,, Italy	464	333	− 131
,, Portugal	18	30	+ 12
,, Germany	11	26	+ 15
,, Norway	21	5	− 16
,, Algeria	19	24	+ 5
,, Greece	15	8	− 7
,, United Kingdom	32	27	− 5
,, Holland	1,492	1,947	+ 455
Steam engines, cranes, pumps, turbines, &c.—			
Total	17,298	18,811	+1,513
To Germany	2,182	920	−1,262
,, France	460	1,932	+1,472
,, Belgium	1,698	2,913	+1,215
,, Holland	853	1,194	+ 341
,, British India	644	404	− 240
,, Japan	1,319	1,296	− 23
,, United Kingdom	1,531	1,176	− 355
,, Spain	574	134	− 440
,, China	65	462	+ 397
,, Argentina	79	225	+ 146
,, Egypt	76	307	+ 231
,, Rumania	583	682	+ 99
,, Russia	570	1,447	+ 877
,, Portugal	276	495	+ 219
,, Colombia	15	8	− 7
,, Chile	21	92	+ 71
Electric meters—			
Total	16,696	19,426	+2,730
To Germany	1,565	1,100	− 465
,, Austria	741	655	− 86
,, France	2,192	2,747	+ 555
,, Italy	470	635	+ 165
,, United Kingdom	1,649	2,238	+ 589
,, Belgium	1,386	1,849	+ 463
,, Spain	1,299	893	− 406
,, Japan	680	844	+ 164
,, Netherlands	672	1,086	+ 414
,, Czecho-Slovakia	1,412	1,682	+ 270
,, Australia	594	329	− 265
,, United States	687	939	+ 252
Electrical apparatus not elsewhere mentioned—			
Total	13,824	17,209	+3,385
To Germany	1,099	964	− 135
,, Austria	437	565	+ 28
,, France	1,608	1,974	+ 366
,, Italy	906	1,091	+ 185
,, Belgium	579	1,194	+ 615
,, Netherlands	1,057	1,216	+ 159
,, United Kingdom	614	810	+ 196
,, Spain	2,839	1,724	−1,115
,, Portugal	255	493	+ 238
,, Norway	300	182	+ 118
,, Czecho-Slovakia	436	823	+ 387
,, Egypt	227	407	+ 180
,, China	49	106	+ 57
,, Japan	254	316	+ 62
,, United States	159	217	+ 58
,, Argentina	467	430	− 37
,, Peru	52	64	+ 12
,, Rumania	187	250	+ 63
,, Poland	944	1,374	+ 430

* Not specified.

British Goods to Reduce British Unemployment.

By BEN QUARMBY.

TO the average layman, with no extensive expert experience or knowledge of advertising, it is a pleasure to see in the REVIEW an advertisement by a large British firm in which it is stated that the design, production, and personnel are entirely and absolutely British. This would appear to be the high water mark in advertising by a British firm, in a British paper, beyond which it would appear to be impossible to go, as by this statement it is made quite clear to all customers of the firm that purchases made from them are employing British labour and machinery to the fullest possible extent.

Such firms should be well patronised and supported by all British firms using their produce, as a sure means of doing our utmost to stimulate our home trade, by keeping the money spent in active circulation in this country, and avoiding the often otherwise sad experience of seeing a percentage of money payments for goods go out of the country, when such conditions do not apply.

In the electrical trade, particularly as by its nature as a public servant it is becoming more universally recognised, and there is assured a certain amount of progress, manufacturers of appliances should use the products of firms able to advertise 100 per cent. British goods and labour, in their components by virtue of the fact that a great proportion of money spent in this country on electrical goods and plant, is for the public services. The latter are paid for by the ratepayers who would be better served by keeping the payments in the country, because by these means it is assured that a portion at least of the expenditure will eventually find its way back into the pockets of the workers, as wages, thus helping to stimulate trade, and keep people in employment.

I am convinced that no other single trade in the country can do more to help the unemployment problem, by its expansion, than can the electrical trade, as, in addition to finding work in its applications, it will also by its growth result in cheaper tariffs, and will thus by its labour-saving virtues bring ease and comfort into thousands of our homes. Expenditure in extending the facilities for supplying electricity can thus be made doubly effective to the nation as a whole, by providing British-made goods from firms who are able to say that their works are entirely British.

Many concerns to-day are overcoming British prejudice by advertising goods as built in Britain, which are manufactured abroad, and merely partly assembled in this country. This is in many cases slightly misleading, and results in a greater portion of the payment finding its way abroad to pay for materials, labour, overhead, and profits, leaving only the barest possible minimum covering actual cost of assembly and sale in this country.

It will readily be seen that the volume of such sales, much of which applies to electrical goods, and is likely to apply even more in the near future, do not contribute to the national welfare so completely as if they had been made in this country by a British firm from British raw materials, and by British labour and machinery.

British works pay their full complement to the national exchequer, by means of rent, rates, and taxes, and are the very back bone of the nation on which the workers depend for work, and sustenance. I, for one, as a layman interested in the efficient progress of our country to renewed prosperity, welcome the new British-made spirit, and am proud of it, and hope to see many other firms adopt the hall-mark of advertising in proudly acclaiming their 100 per cent. in a similar manner.

Canadian Notes.

The Canadian Westinghouse of Hamilton, Ont., has been awarded a contract by the Beauharnois Power Corporation for the construction of seven large power transformers to be installed at the development on the St. Lawrence River. Four of these transformers are claimed to be the largest single-phase transformers ever manufactured in the world, having a weight of 410,000 lb. They are designed for an output of 34,400 h.p. each at 220,000 volts, 25 cycles. The other three are each of 53,000 h.p., at 110,000 volts, and designed for 60 cycles, 3-phase.

The James McLaren Company of Buckingham, Quebec, has applied to the Dominion Government for a charter to develop and operate a power plant of 120,000 h.p. capacity on the Lievre River, a tributary of the Ottawa River. The estimated cost of the completed project is $10,000,000.

The Ontario Hydro-Electric Power Commission has begun the survey of the route of its transmission line from the power development of Abitibi Canyon to the Sudbury District. It will go direct to Copper Cliff, where the distribution station for the entire district will be located. The International Nickel Company will be, it is claimed, by far the largest consumer, having guaranteed a market for at least 16,000 h.p., with a probability that 25,000 h.p. will be needed.

The British Association.—II.*

A general account of the meeting of the British Association for the Advancement of Science at Bristol.

ON Monday, September 8th, the direct electrical interest in the sectional meetings was again non-existent. The presidential address to Section A (Mathematical and Physical Sciences) was delivered that morning by Dr. F. E. Smith, the subject being "The Theories of Terrestrial Magnetism," and the programme for this Section generally was much shorter than it was on either the previous Thursday or Friday. Section G devoted itself to a discussion of matters affecting airship construction and was of interest to engineers generally. It was a matter of some note that we had the designers of R100 and R101 and a representative of the Zeppelin Co., who knew all about the Graf Zeppelin, speaking at the meeting and advocating close co-operation internationally between those concerned with the development of airships. Thus it will be seen that there was practically nothing of especial interest to our readers in the meetings on Monday, September 8th.

In past years industrial psychology has played quite an important part in the Psychology Section—Section J—but even this is far less prominent this year. The only matter that calls for attention is a paper by Dr. C. S. Myers, F.R.S., who formed the National Institute of Industrial Psychology. This was read on Friday, September 5th, and dealt with the place of industrial psychology in a university city. Dr. Myers expressed the belief that in every important industrial university centre we should, before long, see established a lecturer in industrial psychology, whose duty it would be to give theoretical and practical instruction in the subject to certain students of economics, education, commerce, and engineering, and to others who would later take up a business career; they would also carry out research and train future investigators in industrial psychology. Further, these lecturers would promote better vocational guidance, and act as consultants to local industrial and commercial firms, and generally encourage directors to employ in their businesses the methods of industrial psychology.

Electricity Supply Developments.

Tuesday, September 9th, afforded the greatest interest from the electrical point of view of the whole of the meetings of Section G (Engineering), the first paper being one on "The Use of High Steam Pressures and Temperatures in the Generation of Power," by Mr. G. A. Orrock, whilst later in the morning there was a paper by Messrs. A. Lennox Stanton and Theodore Stevens on "Obscured Fundamentals in the Development of Integrated Electricity Supply." Mr. Orrock was unable to be present, and his paper was very ably presented by Mr. W. M. Selvey. Mr. Orrock's name is well known in connection with the development of higher steam pressures and temperatures. For many years he worked with the New York Edison Co., and later started on his own account as a consulting engineer, taking a very keen interest in the economical production of power. Although brief, the paper indicated the line of development towards increased steam pressures and temperatures in power generation, and then considered the increase in efficiency due to the use of higher pressures and temperatures, an empirical formula being suggested as an indication of the maximum possible station efficiency to be obtained, taking into account variation in pressure, temperature, and load factor.

The paper by Mr. A. Lennox Stanton and Mr. Theodore Stevens presented the case for an integrated electricity supply, and referred to its potential possibilities for creating employment. Many who had seen the title of the paper only were a little intrigued as to the precise meaning of the term "integrated," but the authors give the following definition: the phrase "integrated electricity supply" means "the inclusion of everything that serves to make an electrical utility complete throughout all the links which lie between its primary source and any point of applied function, no matter where located, how served, or how applied." The fuller abstract of the paper, given elsewhere, makes the point quite clear, and it may be said that the paper constitutes a piece of profound thinking on an aspect of electricity supply, under the new conditions of the grid system, that hitherto has received little attention.

Education and Economics.

A long discussion took place also on Tuesday, September 9th, in Section L (Educational Science) on English and foreign ideas on methods of education in relation to industry and commerce. Dr. W. A. Richardson called attention to the greater interest taken by educational authorities as regards education for industry, but contrasted the voluntary methods of evening continuation classes for the rank and file of the workers here with the tendency abroad to set up compulsory classes covering all engaged in industry. Notwithstanding this, Dr. Richardson suggested that contact between industry and the educational authorities in this country is more direct and complete than it is abroad, whilst the education provided is less stereotyped and more adaptable to local needs. If we ourselves might mention an instance, it is to be found in the special committees that have been set up in the Tyneside district for giving training in foundry practice and other subjects of special interest to the shipbuilding industries. At the same time, Dr. Richardson points out what is an undoubted fact, *viz.*, that under our voluntary system the bulk of workers in factories receive little or no further education after they enter the factory at quite a young age, and only the more thoughtful and ambitious pass to the higher posts. Other speakers in the discussion referred to the duty of industry towards the young person entering a works, and here, of course, it can be said that a very large number of employers not only afford facilities to their young people to attend continuation classes of a nature which will benefit them in their work, but frequently assist financially, whilst in other cases technical classes are held on the works where no local facilities exist. The electrical industry has often shown the way here, but, with the growth of technical classes at local educational institutions, the work has tended to concentrate there naturally. Mr. M. A. Abbott also commented on the profound influence which the increasing number of junior technical and trade schools will have, and, indeed, is already having on the staffing of industry. This discussion, of necessity, was of a general character, but it drew attention to tendencies which have not been given the prominence they deserve.

As usual, only a few sections met on the final day, Wednesday, September 10th, and of these Section G

* Part I appeared in the ELECTRICAL REVIEW of September 12th, 1930.

(Engineering) had a full programme. This resolved itself into a discussion on the design of steel structures. Section F (Economic Science and Statistics) also met to discuss a paper by Mr. W. Hamilton Whyte on "The Standard of Living and the Post-war Trade Depression." This is a problem which must interest all manufacturers, engineering and otherwise, and the paper throws some light on the reasons why, with an increasing number of unemployed, the standard of living of the employed population has not fallen, and that the inevitable fall in the standard of living of the unemployed has been largely off-set by an increase in the resources of relief and various forms of socialised income. The maintenance of a large section of able-bodied workers in idleness, however, must in time lead to deterioration and an increase of unemployment, inasmuch as a drain is being made on the country's savings. Emphasis is laid on a point that has become increasingly apparent recently, *viz.*, that rationalisation by which production is maintained with a reduced supply of labour is not likely to lead to an increase in the demand for labour; the argument is put forward that only by a reduction of retail prices can the position of unemployment really be met, inasmuch as that such a reduction would increase employment in the production of goods for which the demand was elastic, and at the same time stimulate new industries by releasing new purchasing power and assist export trade by improving our competitive power.

Scope of Papers and Future Plans.

Reflecting on the character of the meetings of the sections of the British Association which most closely concern readers of the ELECTRICAL REVIEW, it must be said that this year the tendency manifested during the past few years for the subjects discussed to be of a more practical nature—without losing sight of the value of the scientific aspect—has been more pronounced than ever. This is particularly true of Section G, the decadence of which, as regards the nature of the papers presented, was discussed some years ago. Of necessity, the proportion of interest of a direct electrical nature must be small and, with a Sectional President eminent in civil engineering matters, it was inevitable that considerable attention should be paid to that branch of engineering. Nevertheless, the Sectional Committee made a very wise and impartial choice of subjects which gave other branches of engineering a chance, and the degree of success attained was well reflected in the size of the attendances, which was higher than we remember for years past. That the interest was sustained at each of the meetings, and the attendance maintained, was due to the policy, in most cases, of having one subject for discussion rather than several papers on widely differing matters.

The attendance this year was about 2,500, which was well up to the average. Next year the Association will celebrate its centenary in London, and special efforts are being made to render the meeting worthy of the occasion. Already an appeal has been made for funds. The British Association is able to arrange the places for its meetings several years ahead, and it may be said that in 1932 it will meet in York, and in the following year in Leicester. Aberdeen is spoken of as the place of meeting for 1934, but that is rather farther ahead than most people can dare to look.

Integrated Electricity Supply.

By A. LENNOX STANTON and THEODORE STEVENS.
(Extracts from a paper read before Section G.—Engineering.)

In the coming electrical age, the most important body of consumers in all areas of dense population will undoubtedly be the (at present) much neglected domestic section, for large-scale growth in this section of the industry has not yet really commenced; nor, assuming that there suddenly arose an exceptionally large and simultaneous demand for connections in that class, would many distribution systems be found ready to cope with it.

Turning to the consumers' end of an "integrated supply," even if all the other links right back to the source of supply are proved to be properly functioning, here also, will be found an equal unreadiness to provide complete facilities for which an undoubted market exists.

Clearly, the present position of electricity supply in the country represents a stage only in the establishment of what it is desired to convey by the use of the prefix "integrated." As far as can be seen, systematic cheap generation, supplemented by complete interconnection, is the immediate objective, and progress must inevitably be slow in those sections of supply which react advantageously on consumers' bills.

The Grid scheme is not designed to transmit huge blocks of power over long distances, but through the development along its length of large generating sites, in the most economic centres for feeding prospective loads, it will act in the same manner as though the areas intersected were traversed by live bus-bars, from which secondary energy may be drawn at the most economic points. This adaptation of lay-out lends itself peculiarly to the attainment at the generation end of an ultimate integrated supply in its fullest sense.

The relationship borne by obscured fundamentals to the whole cannot be properly visualised without some consideration of the trend and scope of the changing conditions which envelop electricity supply in Great Britain at the present time. (To facilitate this requirement, data follow in chart form, chiefly based upon statistics issued by the Electricity Commissioners.)

When the Grid schemes become fully operative, their main function will lie in delivering primary energy as may be required to meet the demands of distributors of secondary energy at more or less uniform cost price per kWh in the zones covered. But what of the secondary distribution, which is as important as the primary, and what of the consumers?

At present the position of this section is full of obscurities, not the least of which is the lack of sufficiently accurate data dealing with those component parts of unit cost commonly applicable to all distribution undertakings of a similar order, and comparable when expressed in terms which clearly show the relations between function, efficiency, and cost.

The capital expenditure on transmission, distribution, &c., of all the public supply undertakers throughout the country at the end of the year 1927-28 was £157.59 millions, being 58.6 per cent. of the total capital expenditure. Since this amounts to a capital outlay of no less than £17.57 per kW of connected load it is obvious that there is urgency for devoting as much care and thought to its economic aspect as is devoted to the generating side.

Considering supply voltages between 100 and 480 volts only, there still existed in the country at the end of 1927-28 no less than thirteen a.c. and twelve d.c. different declared pressures at the consumers' terminals. Little or no evidence is yet available that the extension of networks in a manner commensurate with the possible demand for domestic heating and cooking is receiving practical attention. Will not a settlement of these problems prove an important factor in advancing the ultimate success of the national scheme? Will not an existing situation of complexity become increasingly burdensome and costly, by reason of the continual lack of adaptable yardsticks for elements of conversion, load density, and lay-out design?

These are pertinent questions which cannot well be postponed without avoidable loss, if a satisfactory integrated supply is ever to be available.

Capital and working cost data concerning transmission and distribution, to be of real value, merit extensive amplification both in detail and in scope of application beyond what we are accustomed to find recorded in all current returns.

Overhead line-work forms another section of development around which many anomalies exist. Disliked by many distribution authorities, having predominant underground interests, the place and function of overhead line-work in the economic scheme of load building has never been properly investigated, and therefore regulations of a restrictive order were never challenged.

Generally accepted standards of economic construction are not in evidence, and the cheapest and best methods for supplying demands, in rural areas in particular, are not available.

Turning to the domestic consumer, no compulsory wiring standards are in evidence, and the conditions under which a great deal of the wiring work is carried out are not conducive to the best work, nor always the cheapest, consistent with a satisfactory standard of quality.

No utilitarian objective has been more fruitful of discord than the subject of charges for electricity. Here, again, has been manifested lack of ability to evolve a system that will prove both clear and simple to the average man and woman as well as satisfactorily comprehensive from the suppliers' point of view. Until the absence of an acceptable system is remedied, the consummation of complete integrated supply will remain remote.

A prevailing practice in returns expresses consumption in units per head of population, regardless of whether the supply benefits *the people*. Can any basis of record be more misleading or less useful? Furthermore, this obscurity in what should form a fundamental basis for analytical enlightenment, at all public or other inquiries, is emphasised by a manifest reluctance to produce evidence of estimated consumptions and unit averages of cost and revenue, which clearly

express their relationship to the number and class of consumers. Is it too much to hope that the near future will see this state of affairs remedied, and the value of all returns enhanced, by the inclusion of features which clearly identify for every area the number of consumers. their class, and rate value?

Another feature of misleading publicity finding common expression in the country is the practice of creating figures of merit for comparing consumptions, costs, and prices charged consumers with those of other countries, without any reference to circumstances which must be taken in account if such figures are to posses any value.

Between countries there is no true basis of comparison which ignore quantitative and qualifying factors of the greatest importance. If the respective purchasing powers of actual and potential consumers in the two countries are properly considered, in their relation to all the economic advantages possesed by Great Britain in the matter of resource, available market, &c., the possibilities for large-scale development are of an order second to none. Nevertheless, at present, despite his being able to pay more than the consumer here, by reason of higher monetary values, it is clear that the average U.S. consumer gets his electricity cheaper than does the average British consumer, which condition admits of reversal, if properly handled.

Under conditions of ultimate integrated supply there can be no question whatever but that all the energy of a Severn barrage scheme would be found of supplementary value to the load normally dealt with by steam plants, but the question as to whether it would pay to provide it is surely dependent upon whether there will exist a market for the power so developed that steam plants under equal conditions cannot deal with more cheaply. In an age when political expediencies seem to have obscured the national sense of proportion, it is to be hoped that no Severn scheme will be undertaken without a searching examination into all the financial and contractual liabilities that must be entered into. An examination of many inquiries into developments of public utilites leads to the conclusion that there is need for serious consideration as to how far the co-ordination of theory, practice, sound finance, and the *true* interests of the public are ensured.

To take an example. The "reference" given to the Committee constituted by the Board of Trade, June 20th, 1918, reads:—"To examine and report upon the Water Power Resources of the United Kingdom and the extent to which they can be made available for industrial purposes." That "reference" omits any and all provisos related to either relative or actual economy.

Moreover, notwithstanding the fact that the substance of the final report of the Water Power Resources Committee, dated November 17th, 1921, needs must be examined to-day in the light of rapid engineering advances and changing economic situations, statements are frequently quoted from that report in Parliamentary inquiries under an apparent conviction that those findings are immutable, added to which erroneous conclusions have been drawn concerning statements about "stations operating at high load factors (95 per cent.) estimated from known facts."

Perhaps the most valuable feature brought to light by the report, and subsequent development inquiries arising therefrom, lies in the failure to establish to date any clear and incontrovertible evidence that the economic limits of expenditure on the commercial development of water power in Great Britain will bear a close comparative analysis examination.

Discussion.

Sir Ernest Moir (President, Section G) said the authors' criticism of the Severn scheme was perfectly true. The Severn was a tidal stream which had no continuity except that pumps were suggested for pumping water into a lake that did not exist. He regarded the scheme as farcical. As regards the general development of electricity, there was the Electrical Association for Women, which had 900 members in London and 5,000 members outside London. These women were exceedingly enthusiastic, and were pushing the domestic use of electricity very rapidly. Unfortunately, they were faced with high costs, as pointed out in the paper, but no doubt the women would, with their natural persistence, succeed in getting these costs reduced. Speaking of the grid scheme, the President said he had been informed that to tap off the 132,000-volt transmission lines was only possible at great expense, and would only be done for a very large demand.

Prof. E. W. Marchant said he had been a little puzzled as to what the "obscured fundamentals" were. The grid scheme, mentioned by the President, was very largely a political matter as well as an engineering one. In the case of large industrial towns, the grid scheme would not assist in reducing the cost of electricity, because central stations in these areas could produce electricity more cheaply than the price they had to pay for the grid supply, and they also had to pay a certain amount towards the maintenance of the grid. On the other hand, in the case of districts far removed from the industrial centres, the chance of getting an economical electricity supply without the grid was nil. In reply to the President's remark concerning the cost of tapping from the 132,000-volt lines, this had been stated to be £50,000, and unless there was a large demand in a district it would not pay to tap from the main transmission lines. As to the development of domestic electricity supply, more was to be gained by a suitable tariff than in any other direction, whilst supply engineers should also take up the question of maintenance of domestic electrical apparatus so that a consumer could have a defect remedied promptly. All supply authorities should have their maintenance staffs. It was done in Liverpool, and he hoped it would be done elsewhere.

Prof. F. C. Lea said that in the case of anything going wrong with the water supply, he could always send to the Water Department and get the trouble put right at once, but if anything went wrong with his electrical apparatus he had to do it himself.

Prof. F. G. Baily (Edinburgh) endorsed what had been said with regard to the Severn water-power scheme. It was even a little more far-fetched than some of the Scottish schemes, a careful analysis of which showed that better results would be obtained with coal. The definite limitations to our water power were well known, but we did not know yet what improvements were likely to be made in the use of coal.

Mr. J. S. Wilson (Recorder, Section G) said that although small water-power schemes had been disparaged, consideration should be given to all the facts. For instance, when the Chester scheme was first proposed, it appeared quite hopeless. The head of water was varying all the time, but it was decided to try it. As a matter of fact, the scheme was a phenomenal success, and during the war it proved a perfect God-send because of the difficulty of getting coal. All the tramways and the city lighting was maintained for a considerable period with this small water-power plant on the Dee.

The President said he quite agreed that small water-power schemes should not be despised because they were small.

High Pressures and Temperatures in the Generation of Electricity.

In this paper (which was read by Mr. W. M. Selvey on behalf of the author), Mr. G. A. Orrok, consulting engineer of New York, briefly relates the development that has resulted in the installation of the many high-pressure plants now in use, and states that whereas by 1922 pressures of from 400 to 600 lb. had been adopted, two years later pressures of 1,200 lb. to 1,400 lb. were in use, and that to-day experimental plants are running at 1,800 lb. and 3,200 lb. in every day commercial service. In the same way total steam temperatures have risen and to-day experimental plants are working at 850 to 950 deg. F. with at least one experimental plant at 1,000 deg. in actual operation. In the United States there are 20,000,000 kW of installed machinery up to 500 lb. per sq. in.; 1,350,000 kW running between 500 and 800 lb. per sq. in.; and 270,000 kW from 800 to 1,400 lb. per sq. in., with a few kilowatts of experimental machinery working at higher pressures.

The author then discusses the economies which have been due to these great increases in the operating pressures and temperatures of our generating stations.

The paper contains curves indicating the best economies to be expected for various temperatures and pressures in conjunction with a range of "use" factors, and it is emphasised that, in general, station losses can be much better controlled at high "use" factors. The shape and position of the curves show that the savings due to high pressures and temperatures are real and of considerable magnitude, and comparisons between actual records and the curves further show that the losses become much smaller as the "use" factor increases. It is suggested as a probability that an increase of the "use" factor of 10 per cent. would present economies equal to doubling the pressure. In general, if yearly station records be plotted and an ordinate be drawn from the point down to the curve of the station pressure, the length of the ordinate will represent the possible B.th.u. per kWh that may be saved by better machinery and improved operation at the given "use" factor. These ordinates for modern stations (300 lb. to 1,200 lb., and the period 1925 to 1930) vary between 1,000 B.th.u. and 2,000 B.th.u., while earlier stations may vary from 2,000 B.th.u. to 5,000 B.th.u., especially at low "use" factor. The high-pressure stations of the last few years are within 1,000 B.th.u. of possible saving with higher "use" factors.

Capital costs, of course, vary greatly, but it is suggested that for American conditions, with pressures from 300 lb. to 1,200 lb., a fair figure to use is 100 dollars per kW of maximum 24-hour capacity. Certain high-pressure installations have cost about 6 per cent. more, but it would appear that a newer installation would be somewhat cheaper. The author believes that this statement should hold up to the critical point of 3,200 lb. per sq. in., and adds that from published reports the maintenance and operating costs vary more between installations of the same pressure than any variation shown between high and low pressures. The hours of use and the price of fuel would then be the determining factors in the economies of power generation, but with a fixed fuel cost per million B.th.u., station heat rates would decrease (1) as the "use" factor increases; (2) as the pressure increases; (3) as the increase in total temperature; and (4) as the quality of operation improves. It is pointed out that the "use" factor would be the largest variation, that there would be roughly 1,000 B.th.u. saving for each doubling of the pressure, starting with 200 lb.; that there would roughly be 200 B.th.u. saving for each 100 deg. rise of temperature above 500 deg., and that there could be a decrease of 1,000 B.th.u. to 5,000 B.th.u. between good and poor operation.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this section.

A Gramophone-motor Unit.

THE BRITISH THOMSON-HOUSTON CO., LTD., Rugby, has recently placed on the market a low-priced electric gramophone motor which is self-contained, well-finished and constructed on engineering lines. It affords easy replacement of an existing clockwork motor. It is very compact, and the motor, which runs at about 1,200 r.p.m., is built on the same shaft as the governor and drives the turntable through worm gearing. As

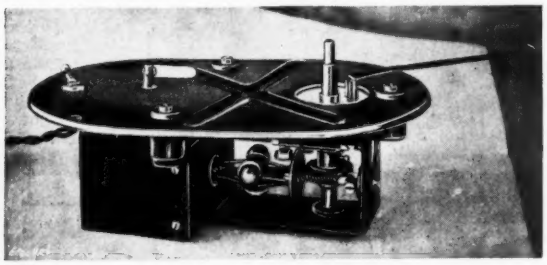

Fig. 1.—" B.T.-H." Electric Gramophone-motor Unit; Turntable Removed.

the construction permits a smaller motor to be used, magnetic hum is reduced to a minimum. A slipping clutch device is fitted between the turntable and the spindle to afford protection against users rotating the turntable by hand in order to pick up speed quickly. On the left of the pressed-steel top plate, fig. 1, is shown the switch for starting and stopping, the speed being regulated through the medium of the lever shown to the right of the equipment. The motor is series wound and will operate on any ordinary lighting circuit, either d.c. or a.c. up to 60 cycles (for above 60 cycles a special motor is supplied), there being incorporated in the equipment a three-position switch which is set, according to the supply on which the motor is to be used, before the motor is put into service. The handle of this switch is shown projecting through the top plate; it is under the turntable and out of the way when the machine is in use. The switch positions are as follows: (1) a.c. 100-125 volts, (2) d.c. 100-125 volts or a.c. 200-250 volts, and (3) d.c. 200-250 volts. The power taken by the motor is less than 20 watts in all cases, and the consumption is 1 kWh for between 900 and 1,200 ten-inch records. All that it is necessary to do to fit the motor to an existing gramophone is to remove the clockwork motor, cut a hole in the top board, drop the motor through, and fix the top plate to the board by four small wood screws.

Improved Service Boxes.

Some useful additions have been made recently to the range of " Cablegrip " service boxes of W. T. HENLEY'S TELEGRAPH

Fig. 2.—Box for 2 or 3 Single-core Distributors and Twin or 3-core Services.

WORKS CO., LTD., Holborn Viaduct, E.C.1, one or two of which are of particular interest. For instance, where distribution is by two or three single-core cables, the box illustrated in fig. 2 allows a service to be taken off very conveniently by means of a twin or three-core cable. Another useful box is shown in fig. 3, from which service cables can be taken off both sides of the main cable. Another box will accommodate two or three single-core distributor cables in troughing, whilst the service can be taken off by means of a twin or three-core

Fig. 3.—Box with provision for Services on each Side of Distributor.

cable. This box is made in two sizes, the maximum dimensions (external) of the troughing for which they are suitable being 6¼ in. by 3 in. and 6¼ in. by 4¼ in.

A New Electricity Meter.

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, E.C.4, have recently put on the market a new electric house-service meter, fig. 4. It is of British manufacture throughout, being made at the company's Woolwich works, and it embodies a number of patented features. The workmanship and finish are described as excellent, the latter being black enamel, relieved with a polished nickel window frame and nickel fittings. It is claimed that the meter will carry 100 per cent. overload for long periods, with sustained accuracy and without undue overheating. All the parts are

Fig. 4.—New " Siemens " House Service Meter.

easily accessible for examination. The following are other outstanding features claimed for the meter; reliability of operation; low starting current; high degree of accuracy; high insulation; interchangeability of parts; and lightweight and small bulk, reducing the cost of transport, packing and installation.

Garden Shields.

We have received from "Adamsaid," Grange Drive, Alder Forest, Worsley, Manchester, a garden "cloche," one of a range which they have introduced for protecting and fostering seedlings, &c. The "cloches" are said to be useful in connection with soil heating electrically. The apparatus consists of a somewhat flexible celuloid-like shroud secured to metal supports and ground prongs. The shroud is claimed to admit ultra-violet rays.

A Pocket Testing Set.

By means of the "Nivex" pocket "Detectoscope," recently introduced by Nivex Gauge, Ltd., Tipping Street, Ardwick, Manchester, definite electrical tests, such as polarity, earth and leakage indication, can, it is claimed, be carried out. The instrument is about the size of a fountain pen, and apparently it works on the "neon-lamp" principle. All the metal parts are protected in a bakelite case, and the instrument will operate on voltages between 100 and 600.

A Mining-school Installation.

Notes on the Electrical Equipment at the new Falkirk Mining School.

A MINING school has recently been established in Falkirk, in the centre of a large mining area, by the Stirlingshire Education Authority, with the assistance of the Miners' Welfare Committee, and it contains some interesting examples of modern electrical mining equipment. The authority very wisely realised that the equipping of such a school demanded specialised and experienced knowledge, and so it commissioned Dr. Parker, F.R.S.E., M.I.Min.E., to design the installation. The electrical installation work was carried out by Messrs. James Scott & Co., the main contractors for the work, while the architect for the reconstruction of the buildings was Mr. Malcolm, the Education Authority's official architect.

A limited sum for the electrical portion was allocated, and Dr. Parker had to plan out the scheme so as to get the greatest flexibility to permit the maximum of possible practical experiments to be made. The practical and technical sides were kept uppermost at the expense of the purely physical and academical aspects, as it was felt that the latter could be catered for by the existing technical colleges and universities in Glasgow and Edinburgh. In previous similar installations it had been the practice to have a large battery to give a wide variation in voltage, but in view of the heavy cost and relatively high depreciation of batteries, and also the fact that large batteries are of little practical value in mines, it was decided to install a small 150-Ah battery for minor experiments, and to utilise the money available for the purchase of more machines.

The installation is so designed as to allow of great flexibility; the switchboards are in skeleton form, and all the windings on the machines are brought to terminals on the boards. All the instruments, switches, and other gear are of the ironclad industrial pattern, with special heavy terminal boxes to enable easy disconnection and reconnection. The electrical apparatus is divided between the electrical laboratory and the mining laboratory, the former containing the various machines for electrical experiments, and the latter electrical furnaces, fans, pumps, and a compressor for mining work.

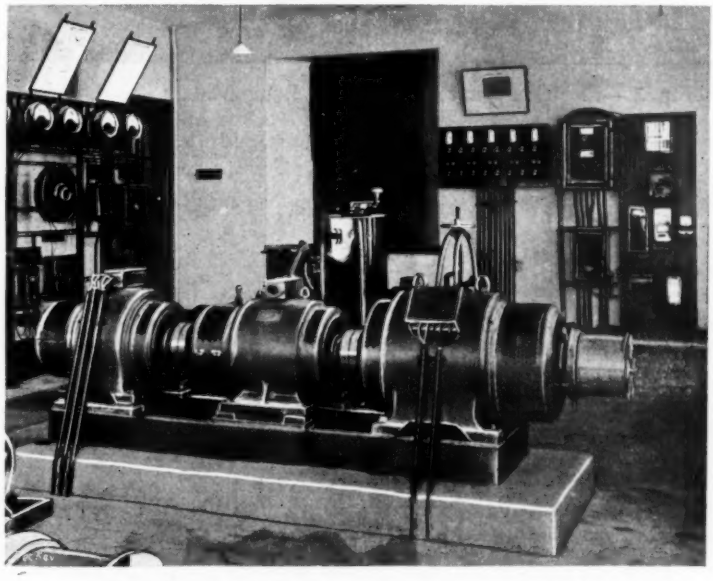

Fig. 2.—No. 2 Three-unit Motor-generator Set.

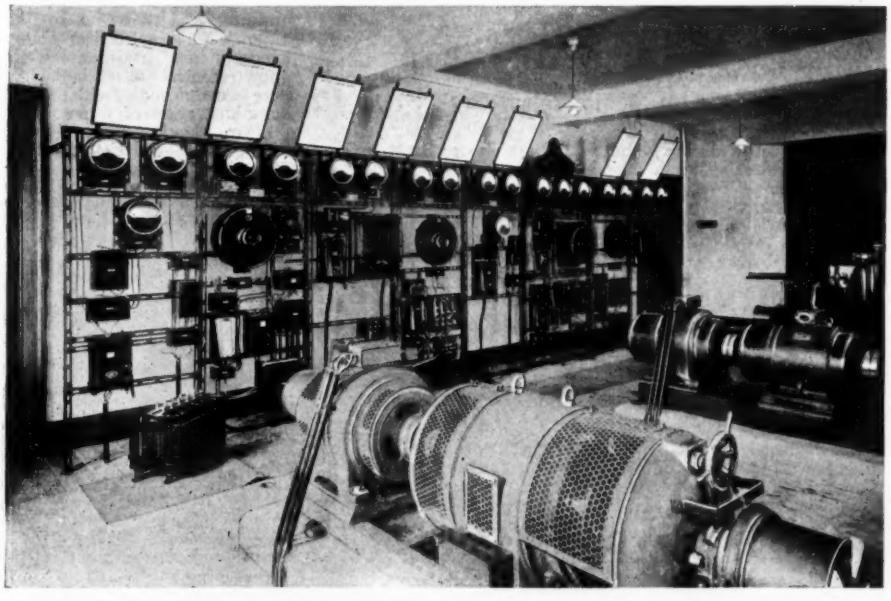

Fig. 1.—Main Switchboard and Machines in Electrical Laboratory.

The main supply for the scheme is taken from the Falkirk Supply Co. at 440 volts, 3-phase, 50 cycles, and both a.c. and d.c. are available in the laboratories at different voltages from the various machines installed. The electrical laboratory section comprises the main switchboard and three motor-generator sets, fig. 1. Set no. 1, fig. 1 foreground, comprises a 9-h.p. a.c. commutator, variable-speed motor, 500 to 1,500 r.p.m., coupled to a 6-kW d.c. compound generator. The shunt field of the generator is split so as to allow of series or parallel connection of the field, and the fields may either be self or separately excited. This machine has a voltage range of from 50 to 250. No. 2 set, fig. 2, consists of a 10-h.p., 1,000-r.p.m., slipring motor, centre, driving a 6-kW d.c. generator, exactly similar to that on set No. 1, and a rotating-field 6-kW alternator, 500 volts, 50 cycles. The d.c. generators on sets Nos. 1 and 2 are so arranged that they can be electrically or mechanically connected for Hopkinson and similar tests. The alternator

is so arranged that it may be driven as a synchronous motor. The slipring motor is started up by means of a tramway-type controller. Fig. 2 shows in the background the slate distri-

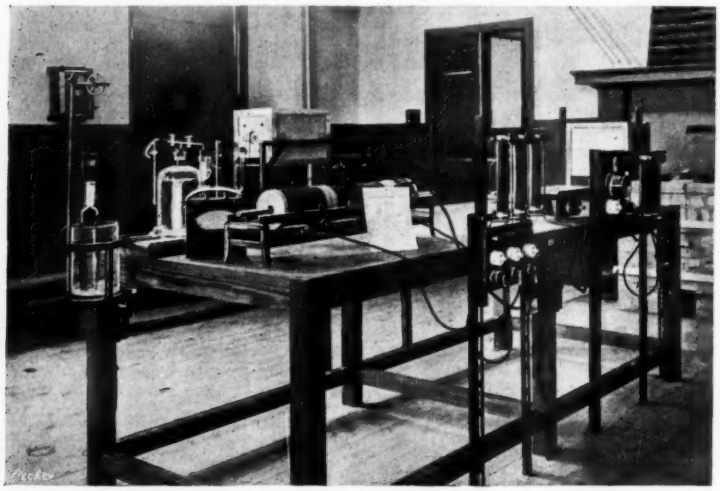

Fig. 3.—Electric Furnace and Heating Equipment in Laboratory.

bution board for feeding bench plugs for low-voltage d.c. experiments. Set No. 3, fig. 4, comprises a squirrel-cage, 5-h.p., 1,000-r.p.m., induction motor driving a series generator. This machine can also be electrically and mechanically interconnected to any of the other two motor-generator sets. All the machines are fitted with specially designed water-cooled brake pulleys, one of which is shown fitted on the alternator shaft of No. 3 set in fig. 4. Drain and cold-water feeds are run under the floor of the laboratory and are available at each machine to enable brake tests to be carried out. The cold water is fed to the inside of the pulley and is centrifugally driven through the holes at the back of the pulley, the water being collected by the brass enclosing cover and run off to the drain underneath.

The method of construction of the switchboard is novel, the supporting frame being of specially slotted ironwork. In the general view of the board in fig. 1 the various interconnecting link and terminal boxes can be seen. Each instrument has its own terminal box, and the terminals are of very heavy construction. The switchboard is wired with specially taped and varnished cables fitted into clips mounted on the iron frame. The wires are all coloured distinctively, and each wire has attached to it at each end an engraved "Ivorine" label. The cables have also special thimbles to make good connections into the terminals. Every terminal in the terminal boxes is labelled with a brass "tab," and every box, switch and instrument is also clearly labelled. Above each "panel" is mounted a diagram of its connections, coloured the same as the cables. The diagrams are fixed at an angle to the boards, so that they can be easily read from the floor. This method of connection allows of lectures being given on the circuit connections along with practical demonstration in the connection and disconnection of the various circuits. The construction of the board allows of additional instruments being fitted. Three 2-kVA transformers by Foster Engineering Co., Ltd., are specially designed to give various pressures up to 440 volts. The windings are so arranged as to enable "Scott" V and T connections. These transformers are portable and fitted with small wheels; on a horizontal panel at the top of each transformer are arranged the terminals for easy connection.

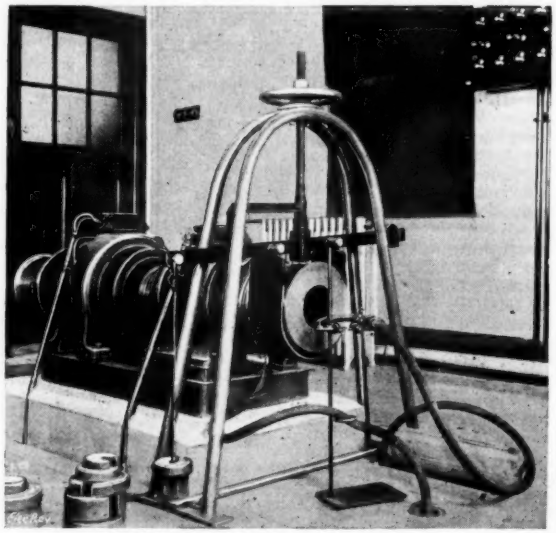

Fig. 4.—No. 3 Motor-generator Set.

Of main interest in the mining laboratory is the electrical and heating equipment shown in fig. 3. The equipment comprises a 2-kW hot plate, a 2-kW combustion furnace, 2-kW muffle furnace, and a 2-kW "Gray King" coal-carbonisation apparatus, with the necessary pyrometers and thermo-couples. Each appliance is fed from a separate circuit at 250 volts, each plug being fitted with a neon indicator lamp. The mining equipment includes a d.c. motor driving a fan, and a Mather & Platt centrifugal pump capable of delivering 300 gal. of water per min. against a head of 30 ft., also driven by a d.c. motor, fig. 5. There is also fitted an air compressor driven by an a.c. motor from the main supply, fig. 5. The compressor serves a "Tangye" pump fitted with a special indicating device to allow diagrams to be taken of both air and water pressures.

In the mining laboratory provision is also made for float and sunk tests on coal, and the complete analyses of coals and gases. There are also wind and muffle furnaces, fired by coke, which serve for metallurgical and other tests. Well-equipped laboratories have also been provided for chemistry and physics, geology and mechanics. In the last-mentioned laboratory a special feature is the provision of a "Bueklon" vertical testing machine for tensile, compressive bending and torsion tests, and also an "Olsen" beam testing machine.

The school was officially opened by the Rt. Hon. Wm. Adamson, M.P., Secretary of State for Scotland, who made mention of the necessity of electrical development in the mines.

The motor-generator sets were supplied by British Thomson Houston Co., Ltd., the switchboard ironwork by Constructors, Ltd., the switchboard and laboratory instruments by Landis and Gyr & Stonebridge Electrical Co., Ltd., and the pumps by Tangyes, Ltd., and Mather and Platt, Ltd.

Thanks are due to The Stirlingshire Education Authority for permission to publish the photographs and descriptive material.

In the establishment of the Falkirk mining school there is recognition by the Stirlingshire Education Authority, by the Miners' Welfare Committee, and by other interested bodies and individuals, that electricity has come to play an important part in the modern development of mining, and that a thorough knowledge of electrical engineering in all its branches is now essential to those who are connected with the administration of mines.

Our thanks are due to Messrs. James Scott & Co., for the above information and the illustrations.

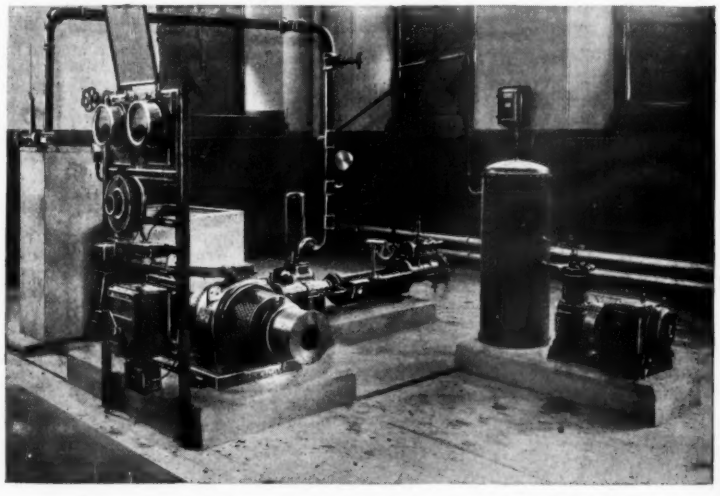

Fig. 5.—Air-compressor and Pumps in Mining Laboratory.

Reviews.

A German-English Technical and Scientific Dictionary. By A. WEBEL. 886 pages. London: George Routledge & Sons, Ltd. Price 36s. net.

After a careful study of the work before us, we can fully appreciate the statement in the preface that it is the result of twenty years' work, and, although no information is given in the dictionary of the author or his qualifications, we can congratulate him on the compilation of a most useful and comprehensive book. As an indication of its wide scope it may be mentioned that there are altogether over 70,000 references, embracing all the modern technical, scientific, and general terms in electrical, civil, constructional, mechanical, mining, and railway engineering, chemistry, mineralogy, metallurgy, physics, crystallography, metallography, mathematics, building, surveying, photography, grammar, textiles, brewing, fuels, furnaces, boilers, hydraulics, drugs, oils, physiology, geology, medicine, woods, coals, dyeing, and papermaking. Truly, this is a wide range of subjects for any one author and as, so far as the writer has been able to check, the translations are correctly given, it is to be hoped that the demand for the dictionary will be such as to give some return for the great amount of knowledge and labour that must have been put into the compilation.

In the main portion of the dictionary, which runs to 726 pages with 64,143 references, no attempt has been made to crowd unduly the pages, so that the picking out of any particular word is not a difficult matter, the more so in that the German words are printed in clear "small cap" letters with the English equivalents in "lower case." Two pages are usefully devoted to a list of elements with their names in both German and English, their chemical signs, atomic weights, specific gravities, and melting points. Equally valuable are the succeeding fourteen pages giving in tabular and alphabetical form the chief abbreviations used in Germany in connection with technical and scientific terms with their meanings in both German and English. The last section of the book consists of about 140 pages devoted to a botanical dictionary with Latin, English, and German terms set out in parallel columns.

Apart from providing an excellent dictionary, Mr. Webel has also devised in connection with it an ingenious method by means of which telegraphic messages can be sent from Germany in code and easily decoded in Great Britain and English-speaking countries. Although simple in itself it is not easy to explain how the code is built up. As a basis five figures are used, the first two of which—the ten-thousands and thousands of the series—are termed the code indicator and appear in sequence from 00 to 70 at the top of each page; in addition each reference in the dictionary terminates in a three-figure number—the hundreds, tens and units of the five-figure series. In this way any particular term has its own special number. Thus the German word "glühlampe" (incandescent lamp) appears on page 208, the code indication of which is 17 and the word number 921=17921. As the telegraphic regulations allow ten letters to be transmitted as one word, the dictionary number of two words is combined, and by means of a coding table a word of ten letters is built up, which, when de-coded gives two distinct words. Put another way, this means that German telegraphic messages can be sent in code at half the cost of an ordinary message, the time occupied, with the dictionary at hand, in coding and de-coding a message, being, after a little practice, infinitesimal.

We do not know whether Mr. Webel intends to complete his labours by issuing a companion English-German volume to the one before us, but it is to be hoped that he is, for it would prove of great help to those who have to translate English technical and scientific text into German, while it is certainly necessary if the full value is to be derived from the ingenious code. Although there may be difficulties in the way that the writer does not appreciate, it would seem that the only alteration in an English-German edition would be that the word numbers, instead of being divided into two sections as in the German-English volume, would have to be combined. Each word, whether in the one volume or the other, would have the same number, the only difference being that in the English-German dictionary, the numbers would not be in sequential order as in the German-English book. The latter is of course necessary for the quick coding and de-coding of German messages. Even with the word numbers in irregular order in an English-German volume, the coding of telegraphic messages would be just as simple; as for de-coding, this could always be done by means of the German-English dictionary; if, however, only the English-German volume were available the difficulty could be got over by the inclusion of an index of word numbers and the pages on which they appear.

We have already indicated that the publishers have done their share in producing a very useful dictionary, the printing being clear and the pages not too crowded. There is, however, one suggestion the writer would like to make. The dictionary, while well bound, is supplied with a paper wrapper on the front of which the scope of the work is very clearly set out. As paper wrappers have a habit of becoming worn and torn, especially in the case of books which are frequently used, we think that the printed matter on the front of the wrapper could very usefully be repeated on the title page of the dictionary itself.

C. J. W.

Storage Batteries. By G. W. VINAL. Second edition. Pp. x+427; figs. 160. London: Chapman & Hall, Ltd. Price 25s. net.

The first edition of this volume was published in 1924, and those who remember the book as it then appeared will find that the new edition is a considerable improvement upon what originally was a very good production. As the author points out in the preface, methods of manufacture have changed in some directions and new data on battery performance have become available during the intervening years, while storage batteries are finding new uses in heavy traction work and in connection with aircraft. As a result of these changes and added spheres of application, the entire book has been revised, many sections have been partly or wholly rewritten, and a new section dealing with batteries for aircraft purposes has been added. The ten chapters comprising the book deal with the following features of the subject. Chapter I is an introduction to the study and is concerned very briefly with the storage battery industry, primary and secondary cells and their groupings, and electrical units. Chapter II deals with the materials and methods of battery manufacture, while chapter III is concerned with the electrolyte from the production stage to that of shipping the liquid. Chapter IV discusses the theory of reactions, energy transformations, and voltage, and chapter V explains the methods of rating the capacities of batteries and of plates. The important and essentially practical aspect of battery operation is dealt with in considerable detail in chapter VI, which includes an excellent section upon the sources of the troubles which are commonly encountered. Studies of battery resistance and efficiency form the subjects of chapters VII and VIII. Chapter IX deals with the testing of storage batteries. The present-day uses for storage batteries are enumerated in the final chapter, which describes the types and sizes required for the different applications, their general constructions, operating characteristics, and care. The book is well produced and, as prices go in these days, it cannot be regarded as unduly expensive. It is certainly well worth adding to one's library.

S.A.S.

Legal.

"British-made" Batteries.

MERCHANDISE MARKS CASE DISMISSED.

AT the Marylebone Police Court, before Mr. Hay Halkett, the Board of Trade prosecuted, under the Merchandise Marks Act, Messrs. H. Miller & Co., Ltd., lamp manufacturers, of Birmingham, for selling three cycle lamp batteries to which a false trade description "British made" had been applied.

Mr. MCCLURE, counsel for the prosecution, said that a well-known battery expert had carefully examined the batteries in question, and he had definitely come to the conclusion that they were in every respect German, as manufactured by a German firm, Cordes & Branz, of Berlin. Samples would be produced showing that the only difference in the German article and that sold by the defendants was the label bearing the words "British made." The expert would say that the cardboard container, the zinc cylinder, the carbon, the dollies or bobbins, and all the parts were exactly the same.

Mr. FOX ANDREWS, for the defence, said he was prepared to admit that in every possible respect the batteries were identical, but those in question were not German.

Evidence was given by Mr. J. O'DWYER, a laboratory assistant to the Ever-Ready Co. (Great Britain), Ltd., and Mr. R. SPETIGUE, B.Sc., chemical advisor to the same company, the latter stating that he had compared the batteries in question with the Cordes & Branz product, and had found them identical as to shape, dimensions, materials, and method of manufacture. He had never seen English batteries made in this way. Under cross-examination, Mr. Spetigue agreed that if an English company obtained a licence from a German patentee, and manufactured in accordance with the German specification, with identical plant and materials, in this country, he would expect the batteries to be indistinguishable.

Counsel then produced four batteries, two of which, he said, had been manufactured in this country and two in Germany, and he asked witness to tell which was which.

Witness replied that two such batteries might be specially manufactured in England of German materials, but there was a question whether it would be economic to import the materials to manufacture for sale on a large scale.

Counsel said that the two English manufactured batteries were part of a consignment of 250 gross from a London company.

Mr. FOX ANDREWS then submitted that there was no case to answer. All the expert had said was that he could see no difference between the batteries in question and some German batteries produced.

The MAGISTRATE said he thought that there was some evidence that it was a German battery.

Counsel then called Mr. F. J. MILLER, managing director of H. Miller & Co. He said that in October, 1929, his firm ordered 250 gross of these batteries from the Grosvenor Battery Co.,

Ltd., of Moorgate, London. He had no reason at all to doubt that the batteries delivered were manufactured by that firm at their Watford factory, which he had visited.

Cross-examined, he agreed that the label bearing the words "Guaranteed British made" were put on by his firm. Asked what inquiries he made before putting on that label, he said he asked the Grosvenor Company where the batteries were made, and he was told at Watford.

Mr. Fox Andrews submitted that, even if there was a *prima facie* case against the defendants, it was clear from the evidence that they had taken all reasonable precaution against committing an offence against the Act.

The Magistrate said that, if the defendants had heard that the batteries were made at Watford, "an ordinary person could not be expected to do more than that." The summons would be dismissed, but without costs, of course.

Mr. Fox Andrews urged that the defendants should be allowed costs. He suggested that he should call evidence to prove that the batteries were manufactured in England, but the magistrate refused to accept this additional evidence, and declined costs, saying, "I don't like giving costs against a public authority." He added that Mr. Fox Andrews could complain to the Board of Trade, and tell them that they should be more careful in the future.

Hire-purchase Agreement.

Sheriff Malcolm, Dundee, on September 11th gave judgment in an important hire-purchase case. The question was whether a wife binds her husband by signing an agreement which contains a penalty clause. His Lordship decided that she did not. Plaintiffs in the action were the Universal Funding Association, Ltd., and respondent was R. Thomson, 39, Lawton Road, Dundee. The Sheriff stated that in September of last year a representative of plaintiffs called on respondent's wife while respondent was from home and obtained her signature to a hire-purchase agreement for a vacuum cleaner. Respondent, on returning home, repudiated the agreement and the cleaner was sent back. He was being sued under a clause or condition of the agreement which made the contracting party responsible for a minimum sum of £3 if the agreement was repudiated before the final payment was made. The defence put up was that respondent was not responsible for this debt incurred by his wife. In the present case the husband had immediately repudiated the article, and it had apparently gone back new and unused to the plaintiffs. The husband was being sued under a penalty or forfeiture clause which bound him to pay a minimum sum of £3 which was simply a penalty for repudiation. His Lordship remarked that he had not come across such an arrangement in the numerous cases of hire-purchase which he had dealt with, and he was not sure that it was a very fair clause, but no doubt it would be enforceable directly against the party contracted with. He did not think it was a condition to which the wife was entitled to bind her husband, neither did he think it could be fairly said that the husband rested on the wife's "implied agency" for agreements for such a penalty or forfeiture clause. Accordingly his decision was *absolvitur*, with expenses.

Unprotected Wires.

At the Old Hill Police Court on September 10th, Messrs. Norton, Ltd., engineers, of the Hecla Works, Tipton Road, Tividale, were summoned for not adequately protecting to prevent danger the trolley wires for an overhead electric crane, and that in consequence James Coombes suffered bodily injury. Mr. G. G. Sumner, H.M. Inspector of Factories, prosecuted. The Bench, said Mr. A. H. Bassano, could not but conclude that the wires were alive when they should have been dead. A fine of £5 was imposed.

Correspondence.

Correspondents should forward their communications* as early as possible.** ***No letter can be published unless we have the writer's name and address in our possession.

That Better Job.

The article by a "Corporate Member" in the Electrical Review for September 5th can be read by some with pleasure and admiration. Fortunate man to be able to put into words our ideals, eliminate the personal aspect, state the case in so unbiased a manner and sum up so graciously! Reading these pages rests the mind, for they take one away from the degrading scramble to accept anything offered and remind us that we start out to obtain a berth after our minds have been suitably trained.

Now I find all my efforts useless. I did plan ahead and I have acquired mechanical and electrical knowledge with suitable additions, and there are vacancies even now that I should be able to fill—here is the snag, *I am over* 36, although I have never felt so mentally and physically alert. It is said that a suitable man's age is never considered, but here is a fact. Although even copies of testimonials are seldom returned, some months ago I received back my application with a ring round "I am 36" when I applied for a berth "age 30-35." I felt this almost an insult, and wondered if such a concern was really fit to have the duty of getting some of the unemployed back into work. I have been told I was too keen and knew too much, when the berths under consideration were of the type I planned to get.

Why not train employers how to engage men? How often they are deceived! Why do not employers allow the first application to be a plain letter? They could then—one week later—prepare a *long* leet of twenty who would be asked for copies of testimonials and other particulars, and finally prepare a *short* leet for interview. This is better than allowing 150 men to prepare copies and full particulars and then keeping them on tenterhooks for two months.

Finally, what are "three recent testimonials"? Mine are about four, seven, and eleven years old. Do they count?

Another Corporate.

September 6th, 1930.

The Heat Wave and Electric Fans.

I was interested in reading in your issue of September 5th that the Birmingham Corporation Electric Supply Department experienced an unprecedented demand for electric fans during the recent short heat wave. It would be interesting to learn whether this demand arose spontaneously or whether it was a result of the department's own enterprise.

So far as London is concerned, I am afraid that electrical retailers "missed the boat" badly. We all know that on sudden wet days retailers of waterproofs and umbrellas quickly make special displays, and I imagined that, in view of all the advice regarding salesmanship, electrical retailers would do the same when such an opportunity for sales of electric fans arose as it did recently. I, however, made a special tour of the district in which I reside to see whether any firm were giving prominence to fans, but my quest was a fruitless one. In only one shop did I find electric fans displayed in the window, and that was a solitary one with no price ticket attached!

A Disappointed Scrutineer.

September 11th, 1930.

Vague Tariffs.

I recently saw an application form for an electricity supply to a house in a new suburban estate. The consumer was given the option between a flat rate of 6d. per kWh and a two-part tariff of 1d. per kWh plus a fixed charge, *details of which would be given on application.* (The italics are mine.) I venture to suggest that this vagueness concerning the fixed charge would tend to make the consumer adopt the flat rate, whereas if he knew at once, without further bother, how he stood, he might choose the multi-tariff. This is hardly fair to the consumer, and I do not think that the supply authorities meant their forms to have that effect.

Perhaps they will remedy this defect and, may we hope, go a step further and endeavour to explain the two-part tariff (verbally or otherwise, by numerical examples) to the often hopelessly-at-sea consumer.

W. Horwood, A.M.I.E.E.

London, W.10, *September 12th*, 1930.

Wireless Sets and Flashers.

The flashers fitted by your correspondent "Flasher" are probably responsible for the interference with reception as my own experience shows.

A year or so ago, a flasher was fitted to a sign about half a mile from here, and, although I did not know of this at the time, I experienced interference soon after darkness fell each evening except Sundays. The sound produced was obviously from a make and break contact and not unlike that from the trembler of an ignition coil, although not regular in frequency; the sounds produced were of two lengths. A friend living nearby found it almost impossible to work his wireless set whilst the flasher was on, his set being partly mains operated and the interference much more severe than on my own set, which is battery operated. My friend saw the sign working and concluded that the frequency of the flashes corresponded with the interference, and I was deputed to interview the owner of the sign. He denied that his flasher was the culprit, but ultimately agreed to carry out a test the following night—a Sunday. Nothing was heard at the appointed time, and on inquiry I found that the usual flasher had not been used, but a similar one had been rigged up inside—the day being Sunday and it being undesirable to switch on the visible sign. At the time I made these inquiries I had arranged for my friend to listen on one wavelength and for my own set to be tuned to another. I got the offending flasher switched on for ten minutes and noted the time.

Both sets recorded the times of switching on and off exactly, and on pointing this out I was successful in stopping the interference.

There has been no interference from this source since the experiments, and I do not know if the sign is being worked with another flasher.

The l.p., a.c. mains supplying the three premises referred to are interconnected, and the interference apparently came through the mains and not by radiation.

Vibrator charging sets are occasionally a nuisance, but these have not recently caused so much trouble. I found that the noise from these could be almost eliminated by switching off the electric supply at the main switches—an obvious inconvenience.

Another slight interference at one time experienced was from a Ford coil used for ignition on a small gas engine some 25 yards from my aerial. This caused only slight interference, but I could count the engine revolutions by the sounds produced.

If "Flasher" is still in doubt, I suggest that he arrange tests between the owners of the flashers and the wireless sets.

H. B. Leighton.

Sheffield, *September 13th*, 1930.

Salesmanship and Price-cutting.

In his short article on the above Mr. Abernethy has dealt with a matter of vital interest to the industry, and everyone will endorse the hope that reorganisation will be undertaken, so that contracts may be placed at prices fair to all concerned.

The depressed state of trade in general has often (and with just cause) been ascribed to high prices brought about by the existence of unproductive middle-men, but does not this article clearly show the value of an unbiased third party for the handling of business between the electrical manufacturer and the buyer?

In the majority of cases the buyer is unable to analyse the technical merits of the various tenders, and accordingly is inclined to decide on price only. As stated in the article, he probably plays off one tenderer against another to the detriment of all concerned.

Such conditions are eliminated, however, when the prospective buyer puts the whole business into the hands of a reputable firm of consulting engineers. The manufacturers are then asked to tender to a complete specification, drawn up to ensure that the client gets the type of plant best suited for his purpose. The tenders are then carefully analysed, the questions of efficiency, power factor, control gear, and extras all receiving due consideration. A true price comparison may then be made, and the client is advised accordingly.

During the period between the receipt of tenders and the final decision the client is advised to refer all makers' representatives to the consultant, who simply states to each that no question of relative prices may be discussed, but that if any part of his tender is not clear the matter will be brought to his notice. Such procedure ensures that all tenderers are given an equal chance, and, if each has put in a straightforward quotation, the final result can cause heartburning to no one.

This course seems one solution to the problem of price-cutting, and, such being the case, manufacturers should be only too pleased, in any particular instance, to welcome the consultant, instead of adopting the slightly antagonistic attitude which sometimes obtains.

A. R. M.

September 15th, 1930.

Published Specifications.

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specification will be printed and abridged, and all subsequent proceedings will be taken.

1929.

5,476. "Electrical apparatus for heating liquids." F. Foy. February 19th, 1929. (333,869.)

5,508. "Electric switchgear structures." Sargent & Lundy, Inc. March 3rd, 1928. (307,062.)

5,661. "Sound-reproducing devices for telephony or the like applications." S. L. Price. February 20th, 1929. (333,884.)

5,802. "High-voltage terminal." F. S. Smith. February 21st, 1929. (333,918.)

6,088. "Indirectly heated cathodes for vacuum tubes." Arcturus Radio Tube Co. February 25th, 1928. (306,832.)

6,159. "Electron-discharge devices." British Thomson-Houston Co., Ltd. April 10th, 1928. (309,442.)

8,894. "Protective devices for electrical apparatus." British Thomson-Houston Co., Ltd. March 19th, 1928. (308,223.)

9,082. "Thermelectronic rectifier." Dr. S. Leewe. March 21st, 1928. (308,311.)

11,669. "Alarms and other apparatus controlled by ultra-violet or infra-red rays." C.E.M.A. (Constructions Electro-Mecaniques d'Asnieres). April 14th, 1928. (309,837.)

15,049. "Sparking plugs." E. J. Buckingham. May 14th, 1929. (333,890.)

15,309. "Arc welding." Elin Akt. Ges. für Elektrische Industrie. May 25th, 1928. (312,358.)

15,374. "Insulating mounting for electrical devices." H. Guillou. May 24th, 1928. (312,318.)

15,489. "Electric switches." British Thomson-Houston Co., Ltd. May 17th, 1928. (311,822.)

15,558. "Apparatus for the simultaneous control of a number of wireless oscillatory circuits and the like." R. Viesi. May 17th, 1929. (333,880.)

15,728. "Electrical pick-ups for gramophones." Lissen, Ltd., and R. P. Richardson. May 21st, 1929. (333,895.)

15,849. "Oscillating circuits applied to electrical musical instruments." J. Bethenod. May 31st, 1928. (312,689.)

15,884. "Telephone systems." Associated Telephone and Telegraph Co. August 6th, 1928. (316,931.)

15,901. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., and C. Gillings. May 22nd, 1929. (333,928.)

16,082. "Electric switches." British Thomson-Houston Co., Ltd. May 26th, 1928. (312,365.)

16,121. "Television and like systems." J. L. Baird and Television, Ltd. May 24th, 1929. (333,942.)

16,134. "Metal boxes such as used for containing switches, fuses, or other electrical appliances." J. A. Crabtree. May 25th, 1929. (333,945.)

16,200. "Telephone sets." H. Reucke and A. Preibisch (trading as R. Kruger Telegraphen), Baunansat (firm of). February 26th, 1929. (333,948.)

16,377. "Contacts for electric circuit breakers and the like." A. Reyrolle and Co., Ltd., and J. Christie. May 28th, 1929. (333,951.)

16,387. "Ignition apparatus for internal-combusion engines." J. Lucas, Ltd., and S. A. Mason. May 28th, 1929. (333,953.)

16,390. "Cycle dynamos." J. Lucas, Ltd., and W. C. Turner. May 28th, 1929. (333,954.)

16,396. "Controllers for electric circuits." W. W. Triggs (Kent Garage Investing Corporation). May 28th, 1929. (333,956.)

16,587. "Electric condensers." Elektrizitäts Akt. Ges. Hydrawerk. May 29th, 1928. (312,652.)

16,676. "Thermo-electric batteries." J. Petrik. June 15th, 1928. (313,602.)

16,757. "Apparatus for the making of measurements in connection with telephone and telegraph cables" Callender's Cable and Construction Co., Ltd., and L. G. Brazier. May 31st, 1929. (333,962.)

17,083. "High-frequency thermionic valve amplifiers." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). June 4th, 1929. (333,971.)

17,084. "Coupling elements, particularly for volume control in wireless circuits." S. G. S. Dicker (Nederlandsche Seintoestellenfabriek). June 4th, 1929. (333,972.)

17,141. "Protective arrangements for electric circuits." British Thomson-Houston Co., Ltd. June 4th, 1928. (313,011.)

17,769. "Electric transformers." British Thomson-Houston Co., Ltd. June 11th, 1928. (313,443.)

17,964. "Electrodes or welding rods for use in the process of electrically welding or depositing metals." J. E. Pollak (R. D. Thompson and G. C. Mills). June 11th, 1929. (333,985.)

18,501. "Electric resistances." British Thomson-Houston Co., Ltd. June 15th, 1928. (313,627.)

19,201. "Radio receiving system." Arcturus Radio Tube Co. June 23rd, 1928. (314,091.)

19,250. "Prepayment devices." G. A. Cheetham, H. Lister, and Associated Electrical Industries, Ltd. June 22nd, 1929. (333,998.)

20,082. "Portable electric handlamp holders." R. Nettl. July 1st, 1929. (334,001.)

21,217. "Combined sparking plug and heater for facilitating the starting of internal-combustion engines." S. E. Hales. November 8th, 1929. (334,013.)

21,497. "Systems of electric motor control." British Thomson-Houston Co., Ltd., and W. J. Pool. July 12th, 1929. (334,014.)

21,505. "Instruments and apparatus for electrical sound reproducing." H. Brantom, H. G. Bawtree-Williams, E. A. Bitton, and H. Austin Storry, Ltd. July 12th, 1929. (Cognate application, 23,045/29.) (334,015.)

22,088. "Control of power-operated switch machines." General Railway Signal Co. July 18th, 1928. (315,804.)

23,077. "X-ray tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 14th, 1928. (318,995.)

23,110. "Devices for supplying current to thermionic valves from supply mains." H. Brantom, H. G. Bawtree-Williams, E. A. Bitton, and H. A. Storry, Ltd. July 27th, 1929. (334,028.)

23,574. "Radio direction finders." Telefunken Ges. für Drahtlose Telegraphie. August 6th, 1928. (316,939.)

23,617. "Apparatus for use in the calibration of electrical measuring instruments." Landis & Gyr Soc. Anon. August 28th, 1928. (318,144.)

24,369. "Electric heating elements." W. W. Triggs (Preferred Electric Co.). August 9th, 1929. (334,040.)

24,401. "Dynamo-electric machines." S. G. Brown. August 9th, 1929. (334,042.)

27,614. "Coil boxes for electric cables." Felten & Guilleaume Carlswerke Akt. Ges. October 20th, 1928. (Addition to 200,830.) (334,076.)

28,929. "Bracket for supporting electric motors." L. D. Wood. September 24th, 1929. (334,085.)

29,968. "Electrical soldering devices." Electrische Lot-Und Schweiss Ges. March 19th, 1929. (334,092.)

30,154. "Electrochemical electric current rectifiers." H. Andre. October 5th, 1928. (334,093.)

30,530. "Incandescent electric lamps with movable reflectors." K. Ungerer. March 4th, 1929. (334,098.)

30,613. "Advertising and like signs." A. H. Brackensey and Franco British Electrical Co., Ltd. October 9th, 1929. (Addition to 254,450.) (334,099.)

32,232. "Wired-wireless receivers." A. Warwick, J. A. A. Taylor, and H. C. Holmes October 23rd, 1929. (334,112.)

32,357. "Mains supply units for thermionic valves." Telefunken Ges. für Drahtlose Telegraphie. October 25th, 1928. (334,114.)

33,698. "Automatic and semi-automatic telephone systems." Telefonaktiebolaget L. M. Ericsson. November 8th, 1928. (334,124.)

34,194. "Heat radiators, particularly for transformer coolers." Associated Electrical Industries, Ltd. November 9th, 1928. (334,127.)

34,675. "Alternating-current potentiometers." H. Tinsley and D. C. Gall. November 13th, 1929. (334,131.)

35,883. "Method and apparatus for sorting out defective dry-battery cells." W. Schmidt. January 3rd, 1929. (334,137.)

36,093. "Production of a good conducting electrical connection between metal compound layer and a coating of a ductile metal applied thereon." Siemens-Schuckertwerke Akt. Ges. December 5th, 1928. (334,140.)

38,979. "Electric resistances." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. May 22nd, 1929. (334,148.)

39,453. "Röntgen tubes." F. Rother. December 24th, 1929. (334,149.)

1930.

751. "Electric clocks." H. Kienzle. January 12th, 1929. (334,154.)

12,592. "Casings for temperature-sensitive circuit-closers for fire-alarm systems." G. H. Brady. June 11th, 1929. (Divided application on 333,003.) (334,164.)

23,443. "Electric lampholders." J. R. Pullon. February 12th, 1929. (Divided application on 333,565.) (333,892.)

Trade Mark Applications.

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 10th:—

Ipso. Made in Germany (lettering and design). No. 512,449. All goods in Class 8. Ipso, the Best on the Market (lettering and design). No. 514,173. All goods in Class 8.—Die Elektrochemische Fabrik Alfred Baehr, Gesellschaft, 18-19, Lindauerstrasse, Berlin, N.65, Germany. (British representative: D. Grabow, 19, Minster Road, N.W.2.)

Emcol. No. 513,264. Class 8. Motor-car batteries.—Moore & Co. (Leeds), Ltd., 51a, St. Paul's Street, Leeds.

Junobrand. No. 515,097. Class 8. Electric cables.—Johnson & Phillips, Ltd., Victoria Works, Charlton, S.E.7.

EECPLD (lettering and design). Nos. 514,769 and 514,770. Classes 15 and 16. Plaques, standards, and small statuary made respectively of glass and porcelain.—Einstein's Electro-Chemical Process, Ltd., 3, Central Buildings, Westminster, S.W.1.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ABINGDON.—Senior school (240 places); Church of England School Council.

ACCRINGTON.—Fire station and firemen's dwellings, Manchester Road; borough surveyor.

BACUP.—Waterworks (£30,000); borough waterworks engineer.

BEACONSFIELD (BUCKS.).—Laundry, Horseshoe Crescent, for the Beaconsfield Laundry Co.

BEAULIEU (HANTS.).—Re-erection of Old Ways, residence of Sir Thomas Troubridge.

BERKSHIRE.—Schools, Bracknell, New Mile, Wokingham, and Tilehurst, for the county E.C.

BIRKENHEAD.—Baths, South End, with filtration plant, &c. (£45,950), for the T.C.; borough surveyor.

BLACKPOOL.—Bank premises, Lytham Road; Martins Bank, Ltd. Alterations and additions to the Winter Gardens; manager.

BRADFORD.—Houses (45), Horton Grange; G. R. Atkinson.

BUXTON.—Re-erection, tar macadam works, Harpur Hill, for Hillhead Quarries, Ltd. (£100,000).

CANTERBURY.—Houses (66) for the T.C.; city surveyor. Labour exchange, Marlowe Avenue (£30,000), for H.M. Office of Works, King Charles Street, S.W.

CARLISLE.—Alterations, for the Royal Insurance Co., Lowther Street; H. Foxall, architect. Houses (50), Raffles estate; J. & R. Bell, Ltd. Extensions, 'Bus depôt, for Carlisle Motor Services, Ltd., Peter Street; S. W. B. Jack, architect.

CHATHAM.—Extensions, New Road schools, for the borough E.C.; E. B. Lee, clerk.

CLAYTON-LE-MOORS.—Offices and extensions to printing works for Jas. Broadley, Ltd.; J. R. Ashworth, architect, Peel Street, Accrington.

CUMBERLAND.—Conversion of Dovenby Hall to mental colony (£25,659) for Cumberland, Westmorland and Carlisle Joint Committee for the Mentally Defective; clerk.

DARTFORD.—Houses (52), Windsor Avenue; W. J. Brise.

DOUGLAS (I.O.M.).—Extensions, Noble's Hospital; J. E. Teare, architect.

DUKINFIELD.—Houses (200) for the T.C.; Halliday & Agate, architects, Manchester.

DUNFERMLINE.—Labour exchange, Carnegie Street, for H.M. Office of Works, King Charles Street, London, S.W.

EDINBURGH.—Garage at cleansing depôt, for Corporation; city architect.

EPPING.—Municipal offices with hall (600 seats) for the U.D.C.; surveyor.

ESTON.—Bakery, Ann Street; Middlesbrough Co-op. Society, Ltd. Cinema and shops, Redcar Road and Albion Street; Exors. of Mrs. A. Campbell.

FARNHAM.—Alterations, 22, The Borough; Barclays Bank, Ltd.

FIFESHIRE.—Additions to Buckhaven secondary school (£20,000); master of works, County Council Offices, Cupar.

GOSFORTH (NEWCASTLE-UPON-TYNE).—Houses (100) for the U.D.C.; George Nelson, architect.

GREAT WARLEY.—Factory and houses (134), Great Warley Street; E. B. Drive & Co.

HASTINGS.—Houses at Hollington; borough engineer.

IRISH FREE STATE (CORK).—Extension to premises, North Main Street; Chillingworth & Levie, architects, 11, South Mall.

KENT.—Central school, Broadstairs, for the county E.C.

KIRKCALDY.—Re-erection of the Twenty-One Club, Hill Street; secretary.

KNUTSFORD.—Fire station and garages for the U.D.C.; surveyor.

LEEDS.—Municipal offices, for corporation; Mr. Harris, architect. Extensions to St. Anne's Schools; Marten and Burnett, architects.

LONDON (BETHNAL GREEN, E.).—Tenements (75), Hackney Road; E. C. P. Monson, architect.

(STOKE NEWINGTON, N.W.).—Block of flats, Leconfield Road; George Elkington & Son, architects.

(BERMONDSEY, S.E.).—Tenements, Paradise Street; Gillman and Spencer, Ltd. Buildings, Rotherhithe Street and Clark's Orchard; Gillman & Spencer.

(ROTHERHITHE, S.E.).—X-ray department, St. Claves Hospital, Lower Road; H. W. Spinks.

(S.E.).—Business stores, Rye Lane, Peckham, and bakery, Rushey Green, for the Woolwich Royal Arsenal Co-operative Society; secretary.

(CHELSEA, S.W.).—Eight blocks of tenements, Manor Street; Peabody Trust.

(WESTMINSTER, S.W.).—Reconstruction, 14, Bruton Street; A. G. Macdonald, architect.

(KENSINGTON, W.).—Buildings, High Street and Earls Court Road; Cyril E. Hartsborne, architect.

LUTON.—Town hall for the T.C.; Bradshaw Gass & Hope, architects, 19, Silverwell Street, Bolton. Elementary school, Denbeigh Road; Percy Brockbank, architect.

MARPLE.—Houses (40), Stockport Road, for Bramwell and Taylor. Houses (31), Andrew Lane, for S. T. Marchant.

MITCHAM.—Factory extension for Hadfields (Merton), Ltd., Western Road; A. F. Faulkner, architect.

MOTHERWELL.—New church; the minister, Manse Road Church.

NORFOLK.—Central schools, East Dereham (£13,000), Litcham and Terrington (£10,800); for the county E.C. Isolation hospital; county surveyor. New blocks, Little Plumstead mental colony; county architect.

NORTHERN IRELAND (ARMAGH).—Houses (163); W. Calvert, clerk to the R.D.C.

NOTTINGHAM.—Factory (£300,000), Beeston, for Boots, Ltd., manufacturing chemists.

PETERHEAD.—Harbour improvement scheme, Port Hendry (£78,000); secretary to the Harbour Board.

PLYMOUTH.—Alterations, 7, 8 and 9, The Octagon; Jay's, Ltd. Pavilion, Holland House, Hartley; A. C. Ballard. Shops and assembly hall, Coburg Street; J. F. Stephens.

PORTSMOUTH.—Juvenile employment bureau, Victoria Road North, for the E.C.

PURFLEET.—Works and plant, for the Ebano Oil Co.

RICHMOND.—Fire station, Kew Road; borough engineer.

SANDBACH.—Aerodrome and motor-'bus station; surveyor to U.D.C.

STOCKTON-ON-TEES.—Re-erection of warehouse, Silver Street and Bishop Street, for J. W. Maddox (£10,000).

STRETFORD.—Extension of the Stretford Memorial Hospital; P. Howard, architect, 88, Moseley Street, Manchester.

THETFORD.—Extensions, girls' grammar school (£7,000); governors.

WAKEFIELD.—Development of garden suburb estate, Eden Avenue; A. Hampshire Lee.

WALLASEY.—Extensions, Oldershaw School; Richard Holt, architect.

WEYMOUTH.—School (£30,000); architect, borough E.C.

WIGAN.—Public baths, Pemberton (£31,219), for the T.C.; borough engineer.

WOKINGHAM.—Houses (46) for the R.D.C.; surveyor.

YARMOUTH.—Schools (£46,000); Olley & Haward, architects.

YORK.—Public baths, Leeman Road (£21,000), for the T.C.; city engineer. Estate development, Shipton Road; Clifton Estate, Ltd.